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THE
MISCELLANEOUS DOCUMENTS

OF THE
HOUSE OF REPRESENTATIVES,

PRINTED DURING THE
SECOND SESSION OF THE THIRTY-NINTH CONGRESS,

1866-'67.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1867.

THE

MISCELLANEOUS DOCUMENTS

OF THE

HOUSE OF REPRESENTATIVES

PRINTED UNDER AUTHORITY

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1866-67

WASHINGTON

GOVERNMENT PRINTING OFFICE

1867

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TO THE

MISCELLANEOUS DOCUMENTS

OF THE

HOUSE OF REPRESENTATIVES,

FOR

THE SECOND SESSION OF THE THIRTY-NINTH CONGRESS,

1866-'67.

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27. The twenty-seventh part of the book is devoted to a detailed examination of the various theories which have been advanced from time to time.

28. The twenty-eighth part of the book is devoted to a detailed examination of the various theories which have been advanced from time to time.

29. The twenty-ninth part of the book is devoted to a detailed examination of the various theories which have been advanced from time to time.

30. The thirtieth part of the book is devoted to a detailed examination of the various theories which have been advanced from time to time.

A LIST
OF
REPORTS TO BE MADE TO CONGRESS,
DURING THE
SECOND SESSION OF THE THIRTY-NINTH CONGRESS,
BY
PUBLIC OFFICERS.

PREPARED, IN OBEDIENCE TO A STANDING ORDER OF THE HOUSE,
BY THE CLERK OF THE HOUSE OF REPRESENTATIVES.

DECEMBER 3, 1866.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1866.

EXTRACT FROM THE RULES AND ORDERS OF THE HOUSE OF REPRESENTATIVES OF THE UNITED STATES.

"It shall be the duty of the Clerk to make, and cause to be printed and delivered to each member at the commencement of every session of Congress, a list of the reports which it is the duty of any officer or department of the government to make to Congress; referring to the act or resolution, and page of the volume of the Laws or Journal in which it may be contained, and placing under the name of each officer a list of reports required of him to be made, and the time when the report may be expected."

LIST OF REPORTS

To be made to Congress at the second session of the thirty-ninth Congress by public officers; prepared in obedience to a standing rule of the House of Representatives.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
	BY THE PRESIDENT OF THE UNITED STATES. <i>Annual.</i>			
1792, April 2	A statement of the amount, with a description of the coins struck at the mint during the year 1866.	Statutes at Large, volume 1.	249	In January.
1829, March 3	The affairs of the penitentiary in the District of Columbia.	Statutes at Large, volume 4.	366	In January.
1846, Aug. 6	Transfers of appropriations for particular branch of naval service to other branches of said service.	Statutes at Large, volume 9.	101	Before the adjournment, if transferred during the session; if transferred during the recess, the first week of the next session.
1865, March 3	Report of the Commissioner of Freedmen's Affairs, with exhibit of the state of his accounts.	Statutes at Large, 2d session 38th Congress.	508	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1866, July 26	A report of the commissioners appointed to examine into the claim of the State of Massachusetts for moneys expended for coast defence during the war.	Statutes at Large, 1st session 39th Congress.	367	During the session.
1854, Jan. 17	<i>Special.</i> Information as to the accommodation of the several courts of the United States, the expenses incurred therefor, and what provision can be made for their greater accommodation; and also as to the difficulties in the use, by the officers of the United States, of the several State prisons.	House Journal.	230	No time specified.
1854, Jan. 23	A report of all despatches written by A. Dudley Mann whilst employed in the diplomatic service of the United States.	Senate Journal.	120	No time specified.
1854, Aug. 4	Report, commercial and statistical, on sea fisheries of New England and British North American provinces, and their influence on trade.	Senate Journal.	673	No time specified.
1856, Aug. 7	A report relative to the establishment of a consulate at Loo Choo islands.	Senate Journal.	539	During the session.
1858, April 22	A report of such information as the departments of the government may afford concerning the nature, character, and extent of the State duties exacted from foreign vessels and merchandise navigating the Elbe by the kingdom of Han-	Senate Journal.	371	No time specified.

1858, Jan.	6	over, and the grounds of such exactions, and the practicability of obtaining for American shipping an exemption therefrom.	House Journal.	141	No time specified.
1858, Jan.	6	A report of the correspondence between the Department of State and our minister near the government of Brazil in relation to the opening of the Amazon river, and the contracting of a reciprocity or other treaty.	House Journal.	141	No time specified.
1858, Jan.	18	A report of all correspondence (not yet published) between the government of the United States and the government of France (including that of our minister at the court of France) upon the subject of the abolition of privateering, and the exemption of private property from capture upon the high seas.	House Journal.	195	No time specified.
1858, Feb.	9	Information relative to negotiations with foreign governments since 1850 for the right of free worship and honorable burial to American citizens resident in or travelling through their dominions, and what governments have rejected these propositions, and the reasons assigned therefor.	House Journal.	362	No time specified.
1858, May	19	Report relative to the condition of the work across the isthmus of Tehuantepec, which has been prosecuted under the Sloo grant, and all the instructions heretofore given by the Executive to the minister of the United States in Mexico affecting the operations of the said Sloo, and whether the said grant has passed into the hands of other parties under the advice of the Executive; if so, who said party is, and upon what terms said party has acquired the claim. And	House Journal.	849	No time specified

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1859, Jan. 7	also whether any mail contract has been granted to the said persons by this government, or any department thereof; and if so, upon what security or authority. Report of the correspondence between her Britannic Majesty's government and the minister of the United States in London touching the abuses of the American flag in the prosecution of the African slave trade on the coast of Africa, and especially touching the cruise of the Wanderer on that coast.	Senate Journal.	115	No time specified.
1859, Jan. 11	Report of the correspondence, instructions, and other information in relation to outrages committed on citizens of the United States on the isthmus of Panama, State of New Grenada.	Senate Journal.	126	No time specified.
1859, Jan. 24	Report made to the President of the United States, by Thomas Rainey, the special diplomatic agent of the United States to the coast of Africa, relative to the Africans captured from the slave brig Echo and sent to Liberia in the United States steam frigate Niagara.	Senate Journal.	179	No time specified.
1859, Feb. 8	Report of the instructions from the Department of State to William Carey Jones, as special agent of the United States, which are alluded to in executive document of the House of Representatives No. 2, of the 35th Congress, 2d session, page 58, being a part of a despatch from the Secretary of State to the minister of the United States to Nicaragua	Senate Journal.	281	No time specified.

and Costa Rica, dated July 25, 1858; also such correspondence, or any part thereof, that Mr. Jones may have had in said capacity with the Department of State, as the publication will be, in the opinion of the President, not inconsistent with the public interest; also, any correspondence or any facts that may be in the knowledge of the executive departments of the government on which could have been based the following "declaration" of Juan R. Mora and Thomas Martinez, under the name of "the supreme chiefs of the two republics of Nicaragua and Costa Rica," dated at Rivas, May 1, 1858, impeaching official agents of the United States, viz: "That hitherto all the official agents of the United States at Nicaragua have been the accomplices and auxiliaries of the invaders, acting as masters, and audaciously hoisting the flag of the United States in all parts where, as at San Juan del Sur, the flag of Nicaragua only ought to float, and openly menaced Central America with an inevitable annexation." Also, whether any apology or explanation that has been given to this government, on the part of said "supreme chiefs," includes a withdrawal of the impeachment so made against "official agents of the United States;" and also, as far as may be consistent with the public interest, any apology or explanation that the authorities of Costa Rica and Nicaragua may have made with reference to said declaration.	5	1860, March	Senate Journal.	216	No time specified.
Report of such despatches as were received at the Department of State from the legation of the United States in London, bearing date of March, 1856; and also of the despatch of	12	1860, June	Senate Journal.	621	No time specified.

LIST OF REPORTS—Continued.

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REPORTS TO BE MADE TO CONGRESS.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
	Mr. Marcy to Mr. Dallas, of the date of April 7, 1856, relative to certain propositions for the settlement of the question between the United States and Great Britain in respect to the colony of the Bay islands.			
1860, July 19	Report of such portions of the despatches of the minister of the United States at Turin as relates to the occurrence of the recent public events in Italy.	Senate Journal.	726	No time specified.
1860, Feb. 16	Report of the correspondence between this government and the republic of Chili with reference to the withdrawal of the exequatur of William Trevitt, consul at Valparaiso.	House Journal.	304	No time specified.
1860, June 23	Report of all papers and correspondence in the Department of State relating to the case of Michael Zeiter, a native of France and naturalized citizen of the United States, and citizen of Ohio, who has been forced to perform military service in the French army.	House Journal.	1208	No time specified.
1861, Feb. 9	A report of the correspondence between the United States and Peru since 1853 on the subject of the free navigation of the Amazon river and its tributaries.	House Journal.	290	No time specified.
1861, Feb. 12	A copy of the letter of John B. Floyd, late Secretary of War, dated November 3, 1860, relating to the claim of William H. DeGroot.	House Journal.	367	No time specified.

1861, August	3	A report of all correspondence between James E. Harvey and any of the heads of departments, relating to charges against said Harvey, growing out of telegraphic despatches to and from said Harvey seized by the government.	House Journal.	236	Next session.
1862, July	17	A report of the trade and commerce of the great lakes.	House Journal.	1123	Next session of Congress.
1862, Jan.	2	A report of all correspondence on the files of the Department of State since the congress of Paris, in 1856, and not heretofore furnished, relating to neutral and belligerent rights on the ocean.	Senate Journal.	77	No time specified.
1862, April	22	A report of all orders, despatches, and communications made by the War Department, or by the major general commanding the armies of the United States, to Brigadier General Thomas W. Sherman, while in command of the military expedition to the South Atlantic coast, and all communications made by General Sherman during the same period to the War Department and to the commanding general.	Senate Journal.	414	No time specified.
1862, June	27	A report of the honorable Joseph Holt and the honorable Robert Dale Owen, commissioners to investigate ordnance and gun contracts, and that he transmit to the Senate all the evidence taken by said commissioners touching the contracts investigated by them.	Senate Journal.	718	No time specified.
1862, July	5	A report of the amounts due the State of Kansas in the several departments, with a view of applying the same upon the taxes due from said State to the general government.	Senate Journal.	759	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1862, July 10	A report of orders of the Executive to Major General George B. McClellan, relative to the advance of the army of the Potomac upon Richmond, and all correspondence between the said General George B. McClellan and the Executive, including that with the War Department, from the date of the President's General Order No. 1, January 27, 1862, to the 1st day of July, 1862; likewise the numerical force of the army of the Potomac, as shown by the morning rolls on the 1st days of November and December, 1861, and January, February, March, and July, 1862; the number of troops which General McClellan took to Fortress Monroe, the number at Fortress Monroe, and the number of reinforcements supplied him up to and including the 25th day of June, 1862; and that at the date of the departure of General McClellan for the peninsula, how many troops were under command of General Frémont in Western Virginia, under General Banks in the valley of Virginia; what number was in front of Washington, or between it and the Rappahannock, and within the intrenchments of Washington, and in and around Washington, and what number of effective troops were actually in service under General McClellan in his engagements on the peninsula and before Richmond.	Senate Journal.	792	No time specified.
1862, Dec. 5	A report of the number and names of the citizens of Kentucky who have been and who are now confined in the military	Senate Journal.	31	No time specified.

1862, Dec.	16	prisons and camps of the United States, outside of the limits of said State; what are the charges against them, by whom made, and by whose order the arrests were made.	Senate Journal.	51	No time specified.
1863, Jan.	12	A report of any unpublished official correspondence touching the culture of cotton in Asia Minor and Egypt.	Senate Journal.	96	No time specified.
1863, Jan.	31	A report of the measures which have been adopted to enforce the provisions of "An act to suppress insurrection, to punish treason and rebellion, to seize and confiscate the property of rebels, and for other purposes," approved July 17, 1862, <i>which relate to the seizure and confiscation of the property of rebels</i> ; also, whether any additional legislation is necessary to facilitate the enforcement of said law.	Senate Journal.	178	No time specified.
1863, Feb.	5	A report of the orders issued by the Secretaries of War and of the Treasury in regard to a general prohibition to export arms and munitions of war from the United States, and especially to the Mexican republic, and any orders in regard to the exportation of articles contraband of war for the use of the French army invading Mexico.	Senate Journal.	200	No time specified.
1863, Feb.	19	A report of the number of volunteers and drafted men actually raised and mustered into the service of the United States by the several States of the Union, and the times when their terms of service may have expired, or will hereafter expire.	Senate Journal.	283	No time specified.
1864, Feb.	26	A report of a copy of the letter of Lieutenant General Scott to the Secretary of War of the 4th of October, 1861.	Senate Journal.	192	No time specified.
		A report of copies of any protests he may have from gover-			

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1864, March 14	nors of States in the department of Missouri against the removal of Major General Schofield from the command of that department, if, in his opinion, they can be furnished without injury to the public service.	Senate Journal.	241	No time specified.
1864, March 25	A report of the rules and regulations, and on what terms, prisoners of war are being exchanged between the United States and the rebels.	Senate Journal.	277	No time specified.
1864, April 1	The report of the Commissioner of Emigration for 1863, with his account of the existing contracts and other necessary information on the question of emigration.	Senate Journal.	293	No time specified.
1864, May 16	A report of the names of all persons who have been sentenced by courts-martial for frauds or peculations against the government, and pardoned by him since the 1st of December, 1863, together with the sentences from which his pardon relieved them; and also the names of all persons likewise sentenced by courts-martial for military offences other than fraud or peculation and similarly pardoned.	Senate Journal.	436	No time specified.
	A report of any correspondence received from the United States consuls at Panama and Aspinwall, New Grenada, in relation to abuse and maltreatment of passengers, seamen, firemen, &c., on board steamships plying between New York and Aspinwall.			

1864, June	11	A report to the Senate of copies of all correspondence, orders, and documents on file in the departments in relation to the organization by the loyal people of Arkansas of the free State government of that State.	Senate Journal.	544	No time specified.
1864, June	22	Requested to communicate to the Senate any orders issued by the Secretaries of War and the Treasury in regard to a general prohibition to export arms and munitions of war from the United States, and especially to the Mexican republic, and any orders in regard to the exportation of articles contraband of war for the use of the French army invading Mexico.	Senate Journal.	610	No time specified.
1864, June	22	The report of the Commissioner of Emigration, as requested by the resolution passed on the 25th day of March last.	Senate Journal.	611	No time specified.
1863, Dec.	15	The report of Major General Blunt (filed by Gilpatrick) on the matter of peculations from the government in subsistence, clothing, and transporting the refugee Indians.	House Journal.	58	No time specified.
1863, Dec.	21	A report of all the official information and correspondence which he may have received respecting the extension of the southwest branch of the Pacific railroad, and as a war measure, as well as any order he may have made respecting the same, and the causes of revoking said order.	House Journal.	88	No time specified.
1864, Jan.	29	A report stating whether brevet rank has been conferred upon any of the officers of the volunteer forces of the United States in pursuance of the act of Congress approved March 3, 1863, and if so, upon whom; and if not, the reason why it has not been done.	House Journal.	203	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1864, March 2	A report of all the diplomatic correspondence on the present state of Mexico, since that published by the 37th Congress; also all the despatches of the honorable E. A. Turpin, minister to Venezuela, relating to the change in that republic from a constitutional form of government to the government of General Paez; also all the correspondence between the Secretary and Henry T. Blow and E. D. Culver, the one late and the other present United States minister to Venezuela.	House Journal.	333	No time specified.
1864, June 7	A report of the defence of Major General S. R. Curtis against the report made by the McDowell investigating commission, including in such communication all papers and evidence submitted on behalf of General Curtis in said defence.	House Journal.	761	No time specified.
1865, Jan. 16	A report of any information in his possession showing the practical operation of the tenth article of the treaty of Washington of the 9th of August, 1842, and the expediency of giving to her Britannic Majesty's government the notice required for the termination of such article.	Senate Journal.	73	No time specified.
1865, Feb. 6	A report whether, since the second day of July last, there have been granted to any individuals other than agents of the treasury, any orders, permits, or licenses, to buy, sell, contract, or in any way to deal in cotton or produce in the seceded States; and if so, what have been the nature	Senate Journal.	138	No time specified.

1865, Feb.	24	A report of what portions of the State of Louisiana were in the military occupancy of the United States on the first Monday of September, 1864, the date of the ratification of the alleged revised constitution of that State, and what portions of the State were then in the military occupancy of the rebels; and also in what parishes or election districts votes were given for or against the ratification of said instrument.	Senate Journal.	231	No time specified.
1866, May	28	A statement showing the amount of cotton in bales, and the value thereof, which was in the hands of the military authorities at the time of the cessation of hostilities, as captured or forfeited cotton, together with all cotton which has since come into the hands of the United States authorities as property of the late so-called Confederate States; also the amount of all cotton in any wise coming into the hands of the federal authorities during the war, and under the care of what officers, and the disposition which has been made of such cotton in each State, both during and since the late war, how sold, to whom, and by whom, and on what commission, and for what price.	House Journal.	759	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1866, July 6	A report whether any, and if so, how many, American vessels have been destroyed by pirates during the last year on the coast of China, and whether any additional legislation is necessary for the protection of American commerce on that coast.	Senate Journal.	613	No time specified.
1866, July 23	Information whether any application has at any time been made to him for the pardon of G. E. Pickett, who acted as a major general of rebel forces in the late war, and if so, what has been the action thereon; and that he communicate copies of all papers or other documentary evidence relative to such application for pardon; and also information whether, since the adjournment at Raleigh, N. C., on the 30th of March last, of the last board or court of inquiry which was convened to investigate the facts attending the hanging of a number of United States soldiers for alleged desertion from the rebel army, any further measures have been taken to bring the said Pickett or other perpetrators of that crime to punishment.	House Journal.	1083	No time specified.
1866, July 27	A report concerning the practicability of establishing equal reciprocal relations between the United States and the different British provinces of North America, including the British possessions on the Pacific; and also concerning the actual condition of the question of the fisheries, with	Senate Journal.	755	During the session.

1866, July	28	such recommendations as he may choose to make, tending to the peaceful arrangement of these important matters.	Senate Journal.	792	No time specified.
1798, July 1799, March	6 } 2 }	<i>Annual.</i> Abstracts of the returns made by collectors of the registered seamen of the United States.	Statutes at Large, volume 1.	696 } 729 }	Early in January.
1819, March	2	A list of passengers arriving in the United States from foreign countries during the year 1866.	Statutes at Large, volume 3.	489	Early in February.
1842, Aug.	26	A full and detailed statement of the expenditure of the contingent fund of the State Department, showing to whom payments were made, and for what, &c.	Statutes at Large, volume 5.	527	Commencement of the session.
1842, Aug.	26	Statements of all moneys expended by disbursing officers, acting under the orders of the State Department, during the year 1866.	Statutes at Large, volume 5.	527	In January.
1818, April 1842, Aug.	20 } 26 }	The names of the clerks and all other persons employed in the Department of State, or any of its offices, during the year 1866, or any part thereof, with the time each was actually employed, and the sum paid each, and whether they have been usefully employed; whether the services of any can be dispensed with without detriment to the	Statutes at Large, volume 3. Statutes at Large, volume 5.	447 525	In January.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1856, Aug. 18	public service ; and whether the removal of any, and the appointment of others in their stead, is required for the better despatch of business ; and the residence of each at the time of his appointment.	Statutes at Large, volume 11.	58	During the session.
1856, Aug. 18	A report of all the fees collected and accounted for by consuls, vice-consuls, commercial agents, and vice-commercial agents.	Statutes at Large, volume 11.	60	During the session.
1866, July 5	A detailed statement of the manner in which the expenditures are made, by the general agent at New York and commissioner general at Paris, as provided for in the joint resolution "to enable the people of the United States to participate in the advantages of the Universal Exhibition at Paris in 1867."	Statutes at Large, first session 39th Congress.	363	No time specified.
1858, April 20	<i>Special.</i> A report of such correspondence as may have taken place between the authorities of this government and that of the government of Chili, in regard to the detention of the American vessels Good Return and Franklin at the port of Talcahuano, in the year 1832.	House Journal.	653	No time specified.

1863, Jan.	20	A report of any information tending to show that American vessels having cleared from any foreign port for Africa, ostensibly for mercantile purposes, have engaged in the slave trade or coolie trade; and to communicate such suggestions for any necessary legislation to prevent such practices as he shall judge proper.	House Journal.	210	No time specified.
1866, July	11	A report in reference to the seizure of property belonging to citizens of the United States, residents of Arizona Territory, on the road from the Arizona line to the port of Guaymas, Sonora, Mexico, by armed bands of Mexicans, and if said bands were organized upon United States territory; and also any information in reference to the alleged massacre of American citizens at Hermosilla, Mexico, by armed Mexicans.	Senate Journal.	637	No time specified.
1789, Sept. 1800, May	2 } 10 }	A report upon the state of the finances, embracing a general view of the revenue and expenditures of the United States for the years 1866 and 1867.	Statutes at Large, volume 1. Statutes at Large, volume 2.	65 79	Early in December.
1789, Sept. 1800, May 1842, Aug.	2 } 10 } 26 }	An estimate of the appropriations necessary to be made for the service of the year ending June 30, 1868, with a statement of the appropriations, heretofore made, applicable to the service of this year; and a statement of the appropriations of former years, with an estimate of those sums which will not be required to defray expenses incurred in a former year; in which are to be specified the sources from which the estimates are derived, and the calculations upon	Statutes at Large, volume 1. Statutes at Large, volume 2. Statutes at Large, volume 5.	65 79 537	Commencement of the session.

BY THE SECRETARY OF THE TREASURY.

Annual.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
	which they are founded, discriminating between such as are conjectural and such as are not conjectural, with the authority for the estimate.			
1791, Dec. 30	An account of the receipts and expenditures of the United States for the year ending June 30, 1866.	House Journal.	68	Early in December.
1792, April 2	An account of the receipts and expenditures at the mint, with an account of its transactions during the year 1866.	Statutes at Large, volume 1.	249	In February.
1806, April 10 } 1834, June 25 } 1834, June 28 } 1843, March 3 }	Statement of the result of the assays made at the mint in 1866 of certain foreign gold and silver coins.	Statutes at Large, volume 2. Statutes at Large, volume 4. Do. Statutes at Large, volume 5.	374 681 607	Early in January.
1808, April 21	Statement of contracts and purchases made by collectors for the revenue service of 1866.	Statutes at Large, volume 2.	485	} Early in January and are generally included in one report.
1808, April 21	Statement of contracts made by direction of the Treasury Department in 1866. Statement of the amount of the expenditures for the relief of sick and disabled seamen in 1866.	Statutes at Large, volume 2.	485	

1809, March	3	Statement of the payments made at the treasury in 1866 for the discharge of miscellaneous claims not otherwise provided for.	Statutes at Large, volume 2.	536	No time specified.
1810, May	1	Statement of disbursements from the treasury in 1866 for expenses of intercourse with the Barbary powers.	Statutes at Large, volume 2.	609	In February.
1817, March	3	Statement of the affairs and condition of the several banks in the District of Columbia on the 31st of December, 1866.	Statutes at Large, volume 3.	387	In January.
1820, Feb.	10	Statement showing the commerce and navigation of the United States for the year ending June 30, 1866.	Statutes at Large, volume 3.	541	First Monday in December.
1830, May	26		House Journal.	608	
1842, Aug.	26		Statutes at Large, volume 5.	537	
1831, May	2	Names of applicants for the benefit of the act for the relief of certain insolvent debtors; the amount due; the names of those who may have been released, with the terms of compromise.	Statutes at Large, volume 4.	469	During the session.
1833, July	14		Statutes at Large, volume 4.	595	
1832, July	10	Statements of the capital, circulation, discounts, specie, deposits, and condition of the State banks.	House Journal.	1110 } 1117 }	During the session.
1836, April	20	An account of the fund arising from the sale of lands under certain treaties with the Chickasaw Indians.	Statutes at Large, volume 5.	10	During the session.
1842, Aug.	26	A full and detailed statement of the expenditures of the contingent fund of the several offices of the Treasury Department, showing to whom payments were made, for what made, &c.	Statutes at Large, volume 5.	527	Commencement of the session.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1842, Aug. 26	Statement of all moneys expended by disbursing officers acting under orders of the Secretary of the Treasury during the year 1866.	Statutes at Large, volume 5.	527	In January.
1818, April 20 } 1842, Aug. 26 }	The names of all clerks and other persons who have been employed in the Treasury Department during the year 1866, or any part thereof, with the time each person was actually employed, and the sum paid each; also, whether they have been usefully employed; whether the services of any of them can be dispensed with without detriment to the public service; and whether the removal of any individuals and the appointment of others in their stead is required for the better despatch of business; and the residence of each at the time of his appointment.	Statutes at Large, volume 3. Statutes at Large, volume 5.	447 525	In January.
1844, June 17	Reasons for any changes that may have been made in the depositories of the treasury during the recess of Congress.	Statutes at Large, volume 5.	696	Next session.
1846, Aug. 6	Regulations to give full effect to and secure a just accountability under the warehousing system.	Statutes at Large, volume 9.	55	Next session after any such regulations are made.
1846, Aug. 7	Cases of neglect, evasion, or violation of the 18th and 19th sections of the independent treasury act.	Statutes at Large, volume 9.	64	Commencement of the session.

1846, Aug.	10	Statement of stolen uncanceled treasury notes paid.....	Statutes at Large, volume 9.	107	With annual report of Secretary of the Treasury.
1847, Jan.	28	Amount of treasury notes issued under act of January 28, 1847; amount redeemed, purchased, reissued, &c.	Statutes at Large, volume 9.	122	Commencement of the session.
1849, March	3	A statement of the amount of money expended at each custom-house in the United States, and the number of persons employed, and the occupation and salary of each person.	Statutes at Large, volume 9.	399	During the session.
1853, March	3	A report of the number and names of the persons employed during the last preceding fiscal year upon the Coast Sur- vey and business connected therewith; the amount of compensation of every kind paid them, for what purpose, and the length of time employed; and to report a full statement of all other expenditures made under the direc- tion of the Superintendent of the Coast Survey; also a general chart of the whole coasts of the United States, &c.	Statutes at Large.	209	In December.
1863, March	3	A report of the number of proceedings and suits commenced, pending, and determined, for frauds upon the revenue, and a statement of all moneys received by the Solicitor of the Treasury and each district attorney.	Statutes at Large, volume 12.	741	During the session.
1866, April	12	A report of the amount of exchanges made or money bor- rowed under the act to amend an act entitled "An act to provide ways and means to support the government," ap- proved March 3, 1865, and of whom and on what terms; and also the amount and character of indebtedness retired under this act, and the act to which this is an amendment, with a detailed statement of the expense of making such loans and exchanges.	Statutes at Large, 1st session 39th Congress.	32	Commencement of the session.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1866, May 18	A report of the annual estimate of the Postmaster General of the money required for the service of the Post Office Department for the ensuing fiscal year.	Statutes at Large, 1st session 39th Congress.	49	Commencement of the session.
1866, July 13	A report of the special commissioner of the revenue, either in the form of bill or otherwise, of such modifications of the rates of taxation or of the methods of collecting the revenues, and such other facts pertaining to the trade, industry, commerce or taxation of the country, as he may find, by actual observation of the operation of the law, to be conducive to the public interest.	Statutes at Large, 1st session 39th Congress.	170	No time specified.
1866, July 26	A report upon a general customs revenue law designed to supersede all other laws on that subject, and embracing all necessary provisions for regulating the foreign and coasting trades, the assessment and collection of duties on goods, wares, and merchandise imported from foreign countries, and other subject-matter immediately pertaining thereto.	Statutes at Large, 1st session 39th Congress.	367	During the session.
1856, March 24	A report relative to the building for a custom-house, court-rooms, and post office at Milwaukee, Wisconsin. <i>Special.</i>	Senate Journal.	199	During the session.

1856, May	16	A report relative to experiments on the coinage of the United States, according to the suggestions of Dr. James T. Barclay, together with the results thereof.	Senate Journal.	336	During the session.
1858, Feb.	1	A report of the annual expense of erecting light-houses and supporting the light-house system since the creation of the Light-house Board, and also the expense for the same number of years preceding the establishment of the said board.	Senate Journal.	147	No time specified.
1858, May	22	A report of specific estimates for "retrenchment and reform" in the expenditures for the several branches of the public service, "to remedy the evils of the excess of expenditures over the means of the government," as mentioned in the report of May 19, 1858; and what efforts have been made, and by whom, since the 4th of March, 1857, to restrain the government to an economical expenditure of the public money, and what have been the results of those efforts.	Senate Journal.	503	No time specified.
1858, June	12	A report of all the collection districts for the collection of duties on imports, showing, in each district, the amount of revenue annually collected; the name of every person employed, directly or indirectly, connected with the collection of the revenue, either as officer or agent, and the amount of compensation paid to each, and the law under which each officer or agent was appointed; the amount expended for salaries of officers and employés annually; the amount expended for custom-houses or rents of offices and warehouses; also what custom-houses or ports of entry or delivery can be dispensed with with a proper regard to economy and the security of the collection of the revenue, and consistently with commercial interests, or what modifications of the laws are necessary for the	Senate Journal.	697	Next session specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1860, Feb. 16	public interests in relation to the collection of customs, and what number of officers can be dispensed with in each of the collection districts. Report of the action, if any, taken under the 3d and 4th sections of the act of March 3, 1859, entitled "An act making appropriations for sundry civil expenses of the government for the year ending the 30th of June, 1860," relating to the construction of public buildings in the city of Philadelphia, and what additional legislation, if any, is necessary to carry out the purposes of said sections.	Senate Journal.	167	No time specified.
1861, July 18	A report of such facts concerning the revenue marine of the United States as will enable them to take such action as may be expedient concerning the remodelling of the same.	House Journal.	104	Next session.
1861, July 22	A report of the amount of money paid to France for the purchase of Louisiana; the amount paid to Spain for the purchase of Florida; the amount, so far as it can be readily ascertained, expended in the late war with Mexico; the amount expended in the wars with the Indians in Florida; the amount expended in removing the Indians from their homes in the several States in which there is now rebellion against the government to a territory west of the Mississippi; the amount expended in surveying the public lands situated in the same States, in deepening harbors, in	House Journal.	127	No time specified.

removing obstructions in rivers and other water-courses, in building fortifications, light-houses, buoys, beacons, dock-yards, court-houses, custom-houses, and post offices, in the same States; the amount expended therein for the establishment of mints, navy yards, arsenals, and armories; the number of acres of land still held by the United States within the boundaries of the same States, and the number of acres of land heretofore granted by the United States to any one of those States, or to any corporation therein, for education, public improvements, or for other purposes; and the amount of money expended by the United States in extinguishing Indian titles to lands situated in said States; and the number of acres of such lands to which the State of Georgia became entitled under the contract between that State and the United States.	1862, March	3	A report of the amounts of the subscriptions to the national loan authorized by the act of July 17, 1861, the amounts collected on such subscriptions, and the purposes to which the amounts so collected have been appropriated.	House Journal.	382	No time specified.
A report relative to the expediency or necessity for the establishment of a branch of the mint of the United States in the Territory of Nevada, and whether or not such measure would advance the public interests and public convenience.	1862, June	2		House Journal.	783	No time specified.
A report of the amount of money paid into the treasury of the United States as the proceeds of the sales of vessels and cargoes which have been captured by the navy of the United States on the high seas since the commencement of the present war; from whence and when received, with the particulars thereof, and whether any part of	1862, June	5		House Journal.	808	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
	such moneys has been paid to the officers and seamen of the vessels by which the captures were made; and if not, that he state the purposes of his department with reference to making such payments to such officers and seamen under any claim based upon the laws of the United States in reference to captures on the high seas.			
1862, Jan. 28	A report of the further legislation necessary to enable the executive department to take charge of the cotton and other lands in South Carolina and elsewhere on our southern coast, now in possession of the troops of the United States, and to place the same under cultivation; and also whether any further legislation is necessary to provide suitably for the blacks in those localities now under the protection of our government, and to furnish them with proper employment.	Senate Journal.	147	No time specified.
1862, Feb. 28	A report made by Edward L. Pierce, agent to Port Royal, and such other information as may be in the possession of the Treasury Department relating to the condition and wants of the people of color in the district of South Carolina held by the military forces of the United States, and also what measures have been taken for the occupation of the lands which have come into the possession of the military forces in that State.	Senate Journal.	252	No time specified.

1864, Feb.	8	A report of the amount of moneys paid out of the treasury of the United States to Victor Smith or other parties, in liquidation of donation or pre-emption claims, building or rent of custom-house, or other expenses connected therewith, at Fort Angelos, Washington Territory.	House Journal.	240	No time specified.
1865, Feb.	18	Report of the amount of import duties and charges remitted by his orders since the 1st day of January, 1864, upon goods furnished to the army and navy of the United States, together with the description of the goods upon which such duties were so remitted.	House Journal.	287	No time specified.
1865, Feb.	23	Report of any facts and information upon the subject referred to in the communication of Edwin G. Easton to the Hon. Wm. H. Seward that shall be required, in order to determine what legislation (if any) is expedient and proper, and to indicate such legislative action as shall be deemed necessary.	House Journal.	323	During the session.
1866, Jan.	29	Information whether income taxes levied and collected from the estates of deceased persons whose deaths occurred subsequently to December 31, 1863, and prior to the levy for that year, are treated by the Treasury Department as lawful collections, while in similar cases for subsequent years such taxes are not collected, or if collected are refunded, and if such be the practice of the department what authority of law there is for such discrimination.	House Journal.	199	No time specified.
1866, July	9	Requested to communicate a statement of the revenue, trade and commerce of the United States with the British provinces since the abrogation of the reciprocity treaty, and any changes in Canadian tariff regulations, and also the comparative importance of Canadian and American com-	House Journal.	973	During the session.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1866, July 12	mercial channels of transportation of property to and from the west to the seaboard, as shown by their returns, together with such other information as may be in his possession at that time, to assist in correctly estimating the relations and value of the trade and commerce of the British provinces to the trade and productions of the United States. A statement showing in tabular form the duties levied on different articles of imported goods under the several tariffs since the tariff act of 1842, and including in such tables the duties proposed by the tariff act now pending in the Senate, with such further information as he may possess as to the proper duties on imported goods.	Senate Journal.	643	Commencement of the session.
1866, July 23	A copy of the account of fines, penalties, and forfeitures returned to the Treasury Department by the collector of the district of Vermont, and the collector of the district of Kentucky, from the 1st day of April, 1864, to this date, together with a statement of the date at which the sums due to the United States therein were paid into the treasury.	Senate Journal.	704	No time specified.

BY THE FIRST COMPTROLLER OF THE TREASURY.

Annual.

1799, March	2	Statement showing the official emoluments and expenditures of the officers employed in the collecting of the customs for the year 1866. NOTE.—This report is usually made to Congress by the <i>Secretary</i> of the Treasury. The law requires it to be made by the <i>Comptroller</i> .	Statutes at Large, volume 1.	708	Early in February.
1809, March	3	Statement of the accounts in the several departments which have remained more than three years unsettled, or on which balances have been due more than three years.	Statutes at Large, volume 2.	536	Early in December.
1817, March 1843, Jan.	3 } 28 }	A list of such officers as have not settled their accounts within the year, for moneys advanced one year prior to September 30, 1866, with the proceedings in each case.	Statutes at Large, volume 3.	364	Early in December.
1843, Jan.	28	A similar list required by resolution of the House of Representatives to be made annually.	House Journal.	274	Early in December.
BY THE TREASURER OF THE UNITED STATES.					
<i>Annual.</i>					
1789, Sept.	2	Statement of his accounts, with an account of the state of the treasury.	Statutes at Large, volume 1.	66	Early in December.
1836, July	2	Statements of receipts and disbursements of the post office establishment.	Statutes at Large, volume 5.	81	During the session.
BY THE SECRETARY OF WAR.					
<i>Annual.</i>					
1794, April	2	An account of the expenses of the national armories, together with an account of the arms made and repaired therein during the year 1866.	Statutes at Large, volume 1.	352	Early in February.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1803, March 2	A return of the militia of the United States, with their arms, accoutrements, &c.	Statutes at Large, volume 2.	207	Early in February.
1808, April 21	A statement of contracts made by the various branches of the War Department on behalf of the United States during the year 1866.	Statutes at Large, volume 2.	485	Early in January.
1809, March 3	A statement of the expenditures of the moneys appropriated for the contingent expenses of the military establishment for the year 1866, (not contingencies of the War Department.)	Statutes at Large, volume 2.	535	Early in January.
1820, May 1	A statement showing the appropriations for the military service for the year 1866, with the expenditure under each specific head, and the balance of the several appropriations unexpended at the end of the year, with an estimate of the probable demands which may remain on each of such balances.	Statutes at Large, volume 3.	567	Early in February.
1830, Feb. 1 } 1842, Aug. 3 } 1843, Feb. 16 }	The Army Register (printed) for 1866, to which shall be annexed an accurate schedule of the pay and emoluments, with the commutation value thereof, to which the officers of each grade are entitled, and opposite the name of each officer his annual pay, his allowance for rations, servants, and forage, and all other allowances.	House Journal. House Journal. House Journal.	227 1453 384	In February.

1842, Aug.	26	A full and detailed statement of the expenditure of the contingent funds of the several offices of the War Department for the year 1866, showing to whom payments were made, for what made, &c.	Statutes at Large, volume 5.	527	Commencement of the session.
1842, Aug.	26	Statement of all moneys expended by disbursing officers of the War Department during the year 1866.	Statutes at Large, volume 5.	527	In January.
1818, April	20	The names of clerks and all other persons employed in the War Department during the year 1866, or any part thereof, with the time each person was actually employed, and the sum paid each, and whether they have been usefully employed; whether the services of any can be dispensed with without detriment to the public service; and whether the removal of any, and the appointment of others in their stead, is required for the better despatch of business; and the residence of each at the time of his appointment.	Statutes at Large, volume 3.	477	In January.
1841, Aug.	26		Statutes at Large, volume 5.	525	
1865, Mar.	3	Report of the condition of the National Military Naval Asylum for the relief of totally disabled officers and men of the volunteer forces of the United States.	Statutes at Large, 2d session 38th Congress.	510	Early in January.
1865, Mar.	3	Detailed report of such temporary relief as may be absolutely necessary, including clothing and provisions furnished during the residue of the fiscal year ending 30th of June, 1866, to the so-called refugee Indians in the Indian Territory.	Statutes at Large, 2d session 38th Congress.	563	During the session.
1866, June	23	A report of any survey or resurvey, under the act making appropriations for the repair, preservation, and completion of certain public works heretofore commenced under the authority of law and for other purposes, with the plan adopted and the items of expenditure under said plan,	Statutes at Large, 1st session 39th Congress.	73	Commencement of the session.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
	and all action taken under the above act; and he shall accompany said report with a statement of the amount and date of all former appropriations for each work, and a full estimate for its entire and permanent completion with the amount that can be profitably expended in the next fiscal year; and he shall also state in what collection district each work is located, and at what or near what port of entry, light-house, or fort; what amount of revenue was collected at the nearest port of entry for the last fiscal year, and as far as practicable what amount of commerce and navigation would be benefited by the completion of each particular work.			
1866, July 28	A report of the amount found to be justly due to the Territory of Colorado for the service of the first regiment of Colorado mounted militia. <i>Special.</i>	Statutes at Large, 1st session 39th Congress.	371	In December.
1861, July 8	A report of the plans and estimates to be prepared by the engineer department for completing the defensive works on the south side of the Potomac, near the city; and also to report upon the expediency of constructing similar works of defence on the northern side of this city, (with estimates for the same,) so as to reduce to a minimum the number of troops required for the protection and defence of the capital.	House Journal.	51	No time specified.

1862, Jan.	13	A report relative to the authority, and by whom, the army supplies and other property held for the military purposes of the United States in the Territory of Utah, and especially at Camp Crittenden and Fort Bridger, were sold, with a statement of the property, its cost and value to the United States, and the amount realized from the sale thereof; and if the sale was made by his authority, that he furnish a copy of the order, and inform the House what notice was given of the sale; and if any of the military supplies in said Territory were destroyed, that he inform the House of the character of such supplies, the value thereof, and the reason of the destruction.	House Journal.	166	No time specified.
1862, Jan.	13	A report relative to the military force of fourteen hundred volunteers recently organized in the Territory of Colorado, by what authority organized, for what purpose, and what disposition has been made of said force, and at what time organized and equipped, and in what manner; and what amount of demands have been credited against the United States on account of said military force, so far as the War Department has been informed, and to what extent such demands have been liquidated by drafts on the treasury; what arms have been purchased by the governor of said Territory, at what cost, and by what authority; and whether it is the intention of the War Department to recognize and liquidate the debts created in said military operations, including the purchase of arms.	House Journal.	167	No time specified.
1862, Jan.	15	A report of what arrangements can be made, and the terms of the same, with the railroad corporations on the line between Washington and New York, by the way of Baltimore and Philadelphia, for the construction of a side track between Bristol and Chester, in Pennsylvania, through west Phila-	House Journal.	181	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
	delphia; and also for the construction of a side track from Back river to the Relay House, in Maryland, through west Baltimore; and also for the construction of another track between the Relay House and Washington, so as to form and open a speedy and direct communication between the said cities of New York and Washington.			
1862, Feb. 10	A report of the correspondence that may be on the files of the War Department tending to show preparation by any State for the armed and treasonable rebellion against the Union.	House Journal.	290	No time specified.
1862, March 14	A report of the number of officers and men in the army of the Potomac who have died since the 4th of March, 1861; what number have died in battle and from wounds, and what number from disease; also how many officers and men have been discharged from the army since the 4th of March, 1861, giving a classified statement of the grounds of discharge.	House Journal.	447	No time specified.
1862, March 24	A report of the correspondence with the Baltimore and Ohio railroad, that between the War Department and the other railroads between Baltimore and New York, concerning increasing railroad facilities between the city of New York and Washington.	House Journal.	475	No time specified.

1862, April	28	A report relative to the prisoners taken on the sloop Velma, and whether released by the United States commissioner at Baltimore with the knowledge and consent of the military authorities of the department of Maryland; also, by what authority Colonel Gunter, of Virginia, who refused to take the oath of allegiance, was released on a conditional parole, which bound him only not to take up arms against the government while the Eastern Shore counties of Virginia remained under United States authority; also, by what authority the said Gunter was allowed to visit the camp of the 6th Maryland regiment at Lafayette square, Baltimore, to search for runaway negroes.	House Journal.	617	No time specified
1861, Dec.	5	A report of any general orders in the military department of Missouri relating to fugitive slaves.	Senate Journal.	27	No time specified.
1861, Dec.	17	A report of the authority conferred upon the provisional governor or other authorities of Missouri to enrol, organize, arm, equip, support, and pay the volunteer militia of that State; when and by whom was such authority conferred; how many militia were thus authorized to be raised; how to be organized and officered; when, where, and how to be employed, and in what manner to be paid.	Senate Journal.	57	No time specified.
1862, Jan.	2	A report of the number of cavalry regiments authorized, the number mustered into the service, where stationed, the condition of their equipment, and whether the public service would be promoted by converting the cavalry regiments authorized but not mustered into the service into infantry regiments	Senate Journal.	77	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1862, Feb. 25	A report of whether any contract has been made, or any steps have been taken looking to a contract, for the construction of any railroad by or under the authority of the War Department; and if so, what is the nature and character of said contract, with whom made, and under what authority or law was it made.	Senate Journal.	237	No time specified.
1862, April 1	A report of the correspondence of General Wool with the War Department, relative to the movement of the army, or a part thereof, since he has been in command of Fort Monroe.	Senate Journal.	354	No time specified.
1862, April 28	A report of the present condition of Harper's Ferry armory, Jefferson county, Virginia; what damage has been done thereto during the existing rebellion, by whom so done, and by what authority; the value of the United States property there in its present condition; the amount of money necessary to repair said damage; and whether it is expedient to repair and restore the said armory, to be employed as heretofore.	Senate Journal.	430	No time specified.
1862, April 28	A report of Henry E. Maynadier, captain of the 10th infantry, of his operations in conducting an escort for emigrants to the Pacific coast in the year 1861, from Omaha City to Fort Walla-Walla.	Senate Journal.	430	No time specified.

1862, May	19	A report of the names of the several persons appointed additional aides-de-camp under the act of Congress approved August 5, 1861; the date of their appointments; where now employed; to the staff of what general officer attached, and upon the recommendation of what general officer appointed.	Senate Journal.	504	No time specified.
1862, June	23	A report of any information the Secretary of War may have in regard to the exchange of prisoners, or of negotiations therefor.	Senate Journal.	694	No time specified.
1862, July	5	The reports of General Canby of the military operations in New Mexico, and particularly his report of the first of March last of the battle of Valverde.	Senate Journal.	757	No time specified.
1862, July	15	A report of the reasons for the arrest of Lieutenant Colonel D. R. Anthony, of the 7th Kansas regiment.	Senate Journal.	841	No time specified.
1862, Dec.	5	A report of all correspondence, telegrams, letters, and reports concerning the military operations of the army of the Potomac since its withdrawal from Harrison's Landing, and all correspondence, letters, telegrams, and reports relating to the surrender of Harper's Ferry, and the testimony taken before the court of inquiry upon such surrender.	Senate Journal.	28	No time specified.
1863, Jan.	5	A report of the number of officers, non-commissioned officers, and privates who have deserted from the army of the United States since the 1st day of July, 1861, and what steps have been taken to punish those guilty of the crime of desertion.	Senate Journal.	78	No time specified.
1863, Dec.	23	A report whether persons held to service or labor by the laws of Delaware, Maryland, West Virginia, Kentucky, and Missouri, have been enrolled according to the provisions of the "Act for enrolling and calling out the national forces,	Senate Journal.	47	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1864, Jan. 5	and for other purposes," approved March 3, 1863; and if not, the cause why such enrolment has not been made. A report relative to the case of Solomon Kohnstamm, of New York, charged with obtaining money upon false and fraudulent claims for collecting, drilling, organizing, and subsisting volunteers.	Senate Journal.	50	No time specified.
1864, Feb. 24	A report of the reasons that have heretofore prevented the arming the militia of the State of Kansas.	Senate Journal.	183	No time specified.
1864, April 8	A report of any information in his possession touching the recent arrest of Captain C. B. Ferguson, quartermaster United States army, and Captain William Stoddard, assistant quartermaster of volunteers, lately in charge of the military depot at Alexandria, Virginia.	Senate Journal.	309	No time specified.
1864, June 13	A report whether the granting of the right of way for the Chicago and Rock Island railroad across the island of Rock Island, in the Mississippi river, provided the track of said road should be laid in such manner and upon such line as the Secretary of War should direct, would injuriously affect the use of said island for the purposes contemplated in an act passed at the present session of Congress, entitled "An act in addition to an act for the establishment of certain arsenals."	Senate Journal.	551	No time specified.

1864, Feb.	29	A report of the proceedings of the court of inquiry convened under Special Order No. 346 of the War Department on the 7th of August, 1863, to inquire into the facts and circumstances relative to the evacuation of Winchester by the command of Major General Milroy, together with all the testimony taken before said court, its rulings on points of evidence, the notes of testimony offered and rejected, the summary of the case by the judge advocate general, and the decision of the President thereon.	House Journal.	314	No time specified.
1864, March	8	A report of the causes for the delay in the payment of the expenses of the draft of the militia in the States of Pennsylvania and New York in October, 1862, and to state whether any legislation is required to facilitate and secure the prompt settlement of said expenses.	House Journal.	359	No time specified.
1864, March	28	A report in reference to the claims of States for the payment for services rendered by State troops to the general government at any time during the present war, stating the character of such service and the amount of the claims.	House Journal.	438	No time specified.
1864, April	4	A report of the number of men called into the military service of the United States since March, 1861; the quota to each State under each call; the number furnished, and also the number tendered under each call; the length of time for which they were accepted; what State or States furnished an excess over its quota; and how many and what State or States did not furnish its quota, and the number deficient.	House Journal.	460	No time specified.
1864, April	7	A report of the number, names, and rank of commissioned officers that have been dismissed from the military service of the United States, by authority of the President, with-	House Journal.	496	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1864, May 16	out a trial by court-martial, since the beginning of the present war, and how many such dismissals have been revoked. A report of the record, and review thereof, of the trial before a military commission of Robert Taylor, a citizen of Tennessee, on a charge of murder.	House Journal.	662	No time specified.
1865, Jan. 25	A report of all officers assigned under the 10th, 11th, and 12th sections of "An act to provide for the better organization of the quartermaster's department," approved July 4, 1864; stating the duty to which each of said officers has been assigned, the rank such assignment entitles him to, and whether selected from the volunteer service or from the regular army, and from what former duty taken.	House Journal.	147	No time specified.
1865, March 3	A supplemental report of Major General George B. McClellan, as to the organization and operations of the army of the Potomac, and having special reference to the organization and operations of the artillery service. BY THE SURGEON GENERAL.	House Journal.	408	No time specified.
1863, Feb. 23	A report of the materials prepared by him relating to the medical and surgical history of the present rebellion, with such other medical statistics as may be in preparation in his office.	Senate Journal.	310	No time specified.

1866, March	1	A statement of the number of regiments of each arm of the service furnished by each State during the recent war, designating them by number or name, how distributed during each year of service, in what battles they were engaged, their aggregate strength on entering service, the number of recruits received by each during each year, the aggregate present at each battle, when engaged, and the number of killed and wounded at each battle.	House Journal.	346	No time specified.
1866, March	16	A report of the facts in relation to the purchase of the steamship Illinois, also the name of the appraisers appointed by the Quartermaster General and the Secretary of War.	House Journal.	411	No time specified.
1866, June	7	A statement of the amount of money expended for the suppression of Indian hostilities, and for the various military expeditions against the Indian tribes during the years 1864 and 1865, stating particularly the amount expended in each year and each expedition respectively.	House Journal.	801	No time specified.
1866, July	9	A statement of the whole number of rations issued under direction of the War Department, from the beginning of the late war, hitherto, to persons not belonging to the army; showing the number of rations issued to white persons, and the number issued to colored persons, in each State, in each year, and also the cost of the rations issued to each class of persons respectively.	House Journal.	974	No time specified.
1866, July	9	A report of the medical statistics collected during the war by Surgeon J. H. Baxter.	Senate Journal.	628	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1866, July 11	A report in reference to the seizure of property belonging to citizens of the United States, residents of Arizona Territory, on the road from the Arizona line to the ports of Guaymas, Sonora, Mexico, by armed bands of Mexicans, and if said bands were organized upon United States territory; and, also, any information in reference to the alleged massacre of American citizens at Hermosilla, Mexico, by armed Mexicans.	Senate Journal.	637	No time specified.
1866, July 16	Directed to furnish copies of opinions given by members of the so-called cabinet of the Confederate States of America, to Jefferson Davis, at or about the time of the negotiations preceding the surrender of Johnston to General Sherman, concerning the effect of such surrender upon the political rights of the people then in rebellion against the United States; and also any other papers in the War Department relating to the same subject.	House Journal.	1021	No time specified.
1866, July 24	A report touching the cost of constructing a railroad on the route mentioned in the charter of the Northern Railroad Company, together with estimates of the probable amount of government transportation on said road derived from such data as may be in his power; and that the Secretary of the Interior render him any aid he may call for in answering this resolution.	Senate Journal.	713	No time specified.

BY THE SECRETARY OF THE NAVY.

Annual.

1808, April	21	A statement of the contracts made by the Navy Department on behalf of the United States in 1866.	Statutes at Large, volume 2.	485	Early in January.
1809, March	3	A statement of the expenditure of the money appropriated for the contingent expenses of the naval establishment during the year 1866, (not the contingencies of the department.)	Statutes at Large, volume 2.	536	Early in January.
1815, Dec. 1843, Feb.	11 } 16 }	A printed Navy Register for 1866, showing the annual pay of each officer, with all emoluments and allowances.	Senate Journal. House Journal.	384 384	Early in January.
1820, May	1	A statement showing the appropriations for the naval service for the year 1866, with the expenditure under each specific head, and the balance of the several appropriations unexpended at the close of the year, with an estimate of the probable demands which may remain on each of such balances.	Statutes at Large, volume 3.	567	First of February.
1832, July	10	A report of the receipts and expenditures of the navy hospital fund in 1866.	Statutes at Large, volume 4.	572	During the session.
1818, April 1842, Aug.	20 } 26 }	The names of the clerks and other persons employed in the Navy Department during the year 1866, or any part thereof, with the time each person was actually employed, and the sum paid each, and whether they have been usefully employed; whether the services of any can be disposed with without detriment to the public service; and whether the removal of any, and the appointment of others	Statutes at Large, volume 3. Statutes at Large, volume 5.	447 525	In January.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1842, Aug. 26	in their stead, is required for the better despatch of business; and the residence of each at the time of his appointment. A full and detailed statement of the expenditure of the contingent fund of the several offices of the Navy Department in 1866, showing to whom payments were made, for what made, &c.	Statutes at Large, volume 5.	527	Commencement of the session.
1848, Aug. 3	A report of the transfers of appropriations from one head to any other head of the appropriations for the naval service for the year 1866.	Statutes at Large, volume 9.	271	During the session.
1852, Aug. 31	A report of the number and names of appointments to the Naval School which have been made; the district and State whence each one comes; the number of existing vacancies, with the congressional district which may be entitled to supply them; and a statement of the order in which the remainder of the congressional districts shall be entitled to all future and accruing vacancies, &c.	Statutes at Large,	102	Every second session.
1866, June 1	A report of the board of examiners to select a site at or near Portland, Maine, for a fresh water basin for iron-clad vessels of the United States navy, and to ascertain the advantages and cost of said site.	Statutes at Large, 1st session 39th Congress.	357	During the session.

Special.

1858, June	14	A report of the pay and amount of allowances made, by existing laws, to each grade of the commissioned officers of the navy of the United States, and a similar statement as to the corresponding grades in the naval service of Great Britain, France, and Russia, in tabular form; his opinion as to the policy of increasing the grade or rank of our naval service; the number in each of such increased grade or grades, and the amount of pay, &c., to be allowed to each of such grades; the number of officers of each grade necessary to command our navy as now existing by law, allowing no cruise to be of longer duration than two years, and no leave on shore for more than six months; and the pay, &c., which should be allowed to such sea-going officers, not discriminating between being at sea or on shore under the limitations stated; the number of officers of each grade necessary to command and manage the various establishments on shore of every description connected with our naval service, including the bureaus, &c., specifying each establishment and the number of officers with their grades in each, and the aggregate of all such officers to be of those no longer fit, from any cause, for sea-going service, yet worthy and capable for duty on shore, and to prevent shore duties from being sought by sea-going officers; to report the per centum of decrease from sea-going pay which should be allowed to those on duty on shore; the pay of pension which should be allowed to such officers as are not fit for duty afloat or ashore, without any demerit or fault of their own, and who in all such cases are retired from service and taken from the line of promotion.	House Journal.	1145	Next session of Congress.
1862, Jan.	16	A report relative to the ships Alabama, at the Portsmouth navy yard, and the Virginia, at the Charlestown navy yard,	Senate Journal.	116	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
	being, with profit to the public service, taken to pieces and the material, or such part thereof as may prove valuable for that purpose, used in the construction of new vessels or the repair of old ones.			
1862, March 27	A report of all correspondence between Edwin A. Stevens, executor of Robert L. Stevens, and the Secretary of the Navy, in reference to the steam floating battery contracted to be built by said Robert L. Stevens, with an abstract showing the sums expended, respectively, on the hull and on the machinery of said vessel.	Senate Journal.	344	No time specified.
1862, Dec. 11	A report of the board of officers appointed by him since the last session, to examine and survey certain proposed sites for the building of a navy yard.	House Journal.	65	No time specified.
1866, July 27	Requested to appoint a suitable officer whose duty it shall be to proceed to Newark, in the State of New Jersey, and examine into the condition of the navigation of Newark bay and the navigation of the mouths of Passaic and Hackensack rivers, and whether the same need improvement.	House Journal.	1173	First Monday in December.
	BY THE POSTMASTER GENERAL. <i>Annual.</i>			
1825, March 5	A statement of the amount of postage accruing in the last	House Journal.	291	During the session.

H. Mis. Doc. 1	4	1825, March	3	year at each of the post offices in the several States and Territories of the United States, classifying the said accounts of postage so accruing by States and Territories.	300		
				A list of such post routes as have not, after the second year, produced the third part of the expenses of transporting the mail on the same.	113	Statutes at Large, volume 4.	In February.
		1836, July	2	A report of contracts for the transportation of the mail within the last year, with all the particulars in relation thereto.	84	Statutes at Large, volume 5.	During the session.
		1836, July	2	A report of all extra allowances to contractors made during the last year, with all extra expenses incurred, and all curtailment of expenses.	84	Statutes at Large, volume 5.	During the session.
		1836, July	2	A report of the incidental expenses of the Post Office Department for the last year.	85	Statutes at Large, volume 5.	During the session.
		1836, July	2	A report of the finances of the Post Office Department for the last year.	85	Statutes at Large, volume 5.	During the session.
		1836, July	2	A report of the fines and penalties imposed on contractors for failures or other causes.	85	Statutes at Large, volume 5.	During the session.
		1836, July	2	A transcript of the record of all offers made for carrying the mails.	86	Statutes at Large, volume 5.	During the session.
		1836, July	2	Estimates for the service of the Post Office Department for the year ending June 30, 1868.	80	Statutes at Large, volume 5.	During the session.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1836, July 2	Proceedings in regard to unlawful combinations respecting the making of mail contracts, if any such combinations have been made.	Statutes at Large, volume 5.	87	During the session.
1842, Aug. 26	A full and detailed statement of the expenditure of the contingent funds of the several offices of the Post Office Department, showing to whom payments were made, for what made, &c.	Statutes at Large, volume 5.	527	Commencement of the session.
1842, Aug. 26	Statement of all moneys expended by disbursing agents of the Post Office establishment during the year 1866.	Statutes at Large, volume 5.	527	In January.
1818, April 20 } 1842, Aug. 26 }	The names of the clerks and all other persons employed in the department of the Postmaster General during the year 1866, or any part thereof, with the time each person was actually employed, and the sum paid to each, and whether they have been usefully employed; whether the services of any can be dispensed with without detriment to the public service; and whether the removal of any, and the appointment of others in their stead, is required for a better despatch of business; and the residence of each at the time of his appointment.	Statutes at Large, volume 5. Statutes at Large, volume 5.	447 525	In January. During the session.
1845, March 3	Copies of contracts for carrying the mails between any of the ports of the United States and a port or ports of foreign	Statutes at Large, volume 5.	749	During the session.

1866, May	16	powers, with a statement of the amount of postage derived under the same.			
		A report of the commission appointed to select a proper site for a building for a post office and for the accommodation of the United States courts in the city of New York.	Statutes at Large, 1st session 39th Congress.	356	No time specified.
<i>Special.</i>					
1856, March	24	A report relative to the building for a custom-house, court-rooms, and post office at Milwaukee, Wisconsin.	Senate Journal.	199	During the session.
1860, Feb.	16	Report of the action, if any, taken under the third and fourth sections of the act of the 3d of March, 1859, entitled "An act making appropriations for sundry civil expenses of the government for the year ending the 30th of June, 1860," relating to the construction of public buildings in the city of Philadelphia, and what additional legislation, if any, is necessary to carry out the purposes of said sections.	Senate Journal.	167	No time specified.
1860, June	22	Report of the reasons for transferring the transportation of the mails from the Jeffersonville and Indianapolis railroad to the New Albany and Salem railroad, together with all the facts connected with said change that he may deem important; and how said change has affected the public interest.	House Journal.	1191	No time specified.
<i>BY THE ATTORNEY GENERAL.</i>					
<i>Special</i>					
1854, Aug.	4	Reports as to the manner of the execution of the Cherokee treaty of New Echota, &c.	Senate Journal.	681	Next session.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1860, Feb. 16	Report of the action, if any, taken under the third and fourth sections of the act of the 3d of March, 1859, entitled "An act making appropriations for sundry civil expenses of the government for the year ending the 30th of June, 1860," relating to the construction of public buildings in the city of Philadelphia, and what additional legislation, if any, is necessary to carry out the purposes of said sections.	Senate Journal.	167	No time specified.
1864, June 30	A report of an investigation of the proceedings had at New Orleans, Louisiana, to condemn the confederate steamer William Bagaley, and examination into the costs and fees charged therein, with the items of the various bills; whether they are legal; and if not, wherein they are illegal; and whether any further legislation is required to guard against exorbitant charges in prize cases.	House Journal.	962	No time specified.
BY THE SECRETARY OF THE INTERIOR.				
<i>Annual.</i>				
1808, April 21	Statement of the contracts made by direction of the Department of the Interior.	Statutes at Large, volume 2.	484	Early in January.
1842, Aug. 26	A full and detailed statement of the expenditure of the contingent fund of the several offices of the Department of the Interior, showing to whom payments were made, for what made, &c.	Statutes at Large, volume 5.	527	Early in January; and are usually included in one report.

1818, April 1842, Aug.	20 } 26 }	The names of all clerks and other persons who have been employed in the several offices of the Department of the Interior during the year 1866, or any part thereof, with the time each person was actually employed, and the sum paid each; also, whether they have been usefully employed; whether the services of any of them can be dispensed with without detriment to the public service; and whether the removal of any, and the appointment of others in their stead, is required for the better despatch of business; and the residence of each at the time of his appointment.	Statutes at Large, volume 3. Statutes at Large, volume 5.	447 525	Early in January; and are generally included in one report.
1830, May	29	A list of applicants for pensions, or for increase of pensions, whose cases are not embraced by the laws, but which ought to be granted.	Statutes at Large, volume 4.	430	In January.
1832, July	10	A report of the receipts and expenditures of the navy pension fund and privateer pension fund in 1866; the names of pensioners, and the amount of their pensions, respectively.	Statutes at Large, volume 4.	572	During the session.
1789, Aug.	7	A report upon the condition of the office of Indian Affairs, and of the various tribes of Indians within the limits of the United States.	Statutes at Large, volume 1.	50	Commencement of session; usually accompanies the annual message of the President.
1789, Sept.	2	A report upon the condition of the General Land Office, the amount of the sales of the public lands, and an account of the surveys made of the same during the year 1866.	Statutes at Large, volume 1.	66	In January.
1865, Feb.	9	Report of the names of certain friendly Indians of the Sioux nation, in Minnesota, for whose benefit money was expended, and the amount expended for each.	Statutes at Large, 2d session 38th Congress.	427	During the session.

LIST OF REPORTS—Continued.

54

REPORTS TO BE MADE TO CONGRESS.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1865, March 3	Report of money expended to carry into effect any treaty stipulation with any tribe or tribes of Indians, all or any portion of whom shall be in a state of actual hostility to the government of the United States, including the Creeks, Choctaws, Chickasaws, Seminoles, Wichitas, and other affiliated tribes, as well as the Cherokees, as may be found necessary to support such individual members of said tribes as have been driven from their homes or reduced to want on account of their friendship to the United States, and enable them to subsist until they can support themselves in their own country.	Statutes at Large, 2d session 38th Congress.	562	Commencement of session.
1866, July 28	A report by the director of the bureau of statistics on the statistics of commerce and navigation, exports and imports.	Statutes at Large, 1st session 39th Congress.	331	Early in Decem'r.
1866, May 16	A report of the commission appointed to select a proper site for a building for a post office and for the accommodation of the United States courts in the city of New York.	Statutes at Large, 1st session 39th Congress.	356	No time specified.
1854, August 2	Report upon the nature of the title of the Christian Indians to lands in the State of Ohio.	Senate Journal.	630	Next session of Congress.

Special.

1857, Jan.	26	A report of the number of the military and other reservations for the settlements of Indian tribes that have been made, the size of each, and the number of Indians upon each; also, the number of white persons upon each, and their compensation, the annual cost to the United States of each reservation, and whether, by the existing regulations, these reservations are worked in common by the Indians for their common benefit, or what means, if any, are used to secure to each Indian the separate enjoyment of the proceeds of his own labor; also, what system has been adopted to induce the Indians to labor upon these reservations, the practical results of that system so far, and whether the proceeds of those reservations have been directed exclusively to the purpose for which they were made.	Senate Journal.	128	No time specified.
1860, May	2	Report of the amount due the Chippewas of the Mississippi and Lake Superior, under the ninth article of the treaty made with those Indians September 30, 1854.	Senate Journal.	425	No time specified.
1860, June	16	Report of an estimate for completing the north front of the Patent Office building with a portico, according to the plan of the architect.	Senate Journal.	681	Next session.
1860, May	18	Report of the amounts paid to the Pokenan or other bands of Indians who were parties to the treaties of the 26th and 27th of September, 1833, at Chicago, and who remained in the State of Michigan, either in money or goods, under the stipulations of the treaty made at the time and place aforesaid with the United nation of Chippewa, Ottawa, and Pottawatomie Indians; also the time and place of payment, and the parties to whom paid.	House Journal.	864	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1861, Jan. 14	A report of copies of all deeds made by the several southern States to the United States for lands to be used for forts, arsenals, dock-yards, navy yards, custom-houses, post offices, hospitals, and other public buildings, from the commencement of the government to the 1st of January, 1861.	House Journal.	186	No time specified.
1861, July 15	A report of the amount of business transacted in the several circuit courts of the United States; the number of cases docketed in each circuit and disposed of each year from the 1st of January, 1850, to the 1st of January, 1860; the number of days each supreme judge was occupied in the several circuits during each year; the aggregate amounts involved in litigation in each circuit, and the number of cases undisposed of on the second circuit dockets on the 1st of January, 1860.	House Journal.	88	Next session.
1862, Feb. 27	A report transmitting the reports made to the Interior Department between May 1, 1861, and August of the same year, by Augustus Wattles, esq., special Indian agent to visit the Sac and Fox, Kaw, Chippewa, Ottawa, Delaware, and Osage tribes of Indians; also the correspondence on file in the Indian bureau between the Interior Department and Mr. George N. Day, in relation to the northern Indian superintendency.	House Journal.	371	No time specified.

1862, March	11	A report of the names and residence of all persons who have applied for pensions on account of wounds received or disabilities incurred by them during the present rebellion, and of those who have been at any time admitted to the invalid pension roll, (except such as were pensioned from the date of their disability;) the time when their pensions commenced; the amount per annum received by each, distinguishing each according to grade, with reference to the several acts of Congress under which said pensions were allowed, to be arranged in alphabetical order, both as to States and names of pensioners, and an estimate of the amount claimed by or due to each, from the date of his disability to the time when his pension commenced, or, if no pension has been allowed, to the date of his or her application.	House Journal.	424	No time specified.
1862, June	26	A report of the number of persons on the pension roll of the United States, at the various rates of pension; the service rendered by such pensioners, whether in the regular army, militia, volunteer service, or navy; and the number of applications for pensions pending and undecided at the time of making such report.	House Journal.	942	Next session of Congress.
1862, June	3	A report of the claim of the register of the land office at Vincennes, Indiana, for office rent; and also the claim of the postmaster of the same place for the custody of the books and papers; and to report to the Senate the amount, in his judgment, due.	Senate Journal.	558	At as early a day as practicable.
1862, June	14	A report of all the information and proof that it may be practicable to obtain relating to the amount of beef actually delivered and furnished to the Indians in the lower part of the State of California by George McDougal, in the	Senate Journal.	646	No time specified.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1864, May 26	year 1852, under a certain contract entered into between him and O. M. Wozencraft, who assumed to act as agent in behalf of the United States, and also relating to the value thereof at the time of its delivery; and to report the same to Congress with all convenient despatch, with his opinion upon the justice and amount of said claim. A report of what tribes of Indians are in arms against the government of the United States; the location and extent of the reserves of such Indian tribes; the tenure by which they hold them; the amounts received by such tribes from the rebel authorities, and the dates when received in the shape of annuities, and the amounts paid and expended by the government of the United States for such Indian tribes since they were paid by the rebel authorities; and also the number of loyal and disloyal of such tribes.	Senate Journal.	480	No time specified.
1864, Jan. 13	A report of the late treaty made on behalf of the United States by Major Keith, agent for the Kickapoo Indians, with said Indians, for the cession of their reservation, or any part thereof, in the northeastern part of Kansas; and also copies of all evidence filed in said department tending to show fraud or any unfairness in the procurement of or in the execution of said treaty; and also copies of all other documents and papers relating thereto now on file in said department.	House Journal.	136	No time specified.

1865, Jan.	16	Report whether the provisions of the act of June 2, 1862, entitled "An act to prevent and punish fraud on the part of officers intrusted with making of contracts for the government," have been complied with by officers under him, and particularly whether the said act has been complied with and executed as to contracts for marble and marble-work and iron and iron-work upon the Capitol extension; and if there has been failure or neglect in the execution of the said act, the reasons therefor, and why the penalties of said act have not been enforced against officers in default.	Senate Journal.	73	No time specified.
1866, April	16	A report relative to the claim of George McDougall.	Senate Journal.	246	No time specified.
		BY THE COMMISSIONER OF PATENTS.			
1837, March	3	A list of all patents granted for the preceding year for inventions and improvements; also a list of patents which have expired during the same period.	Statutes at Large, volume 5.	195	In January.
		BY THE COMMISSIONER OF AGRICULTURE.			
1762, May	15	Report of the practical and experimental information relating to agriculture, collected seeds and plants obtained and distributed among agriculturalists.	Statutes at Large, volume 12.	388	During the session.
		BY THE COMMISSIONER OF PUBLIC BUILDINGS.			
		<i>Annual.</i>			
1829, March	3	The application of the appropriations for 1865, the number of public lots sold, &c., and the state of the buildings and grounds.	Statutes at Large, volume 4.	363	In December.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1838, April 16	Copies of all contracts made in his office for materials furnished or to be furnished, or for labor performed or to be performed, &c.	House Journal.	84	Commencement of the session.
1840, July 21	The manner in which all appropriations for the public buildings and grounds have been applied.	Statutes at Large, volume 6.	815	Commencement of the session.
1822, May 6 } 1834, June 30 }	Copies of the accounts of Indian agents, superintendents, and others charged with the disbursement of money, goods or effects of any kind, for the benefit of the Indians.	Statutes at Large, volume 3. Statutes at Large, volume 4.	683 738	In February.
1848, Aug. 11	A report of the fees for judicial services, and the expenses incident to those services, for the year 1866.	Statutes at Large.	279	During the session.

BY THE SECOND AUDITOR.

Annual.

BY THE COMMISSIONER TO CHINA.

Annual.

BY THE SECRETARY OF THE SENATE AND THE CLERK OF THE HOUSE OF REPRESENTATIVES, (EACH TO HIS HOUSE RESPECTIVELY.)

1836, May 1842, Aug. } 9 26	<i>Annual.</i> A full detailed statement of the expenditure of the contingent fund of their houses, respectively, showing to whom payments were made, for what made, &c.	Statutes at Large, volume 5. Statutes at Large, volume 5.	25 525	Commencement of the session.
1842, Aug. 26	The names of the clerks and all other persons employed in the service of their respective houses during the year 1866, or any part thereof, with the time each person was actually employed, and the sum paid each, and whether they have been usefully employed; whether the services of any can be dispensed with without detriment to the public service; and whether the removal of any, and the appointment of others in their stead, is required for the better despatch of business.	Statutes at Large, volume 5.	525	In January.
1842, March 7	<i>Annual.</i> BY THE CLERK OF THE HOUSE OF REPRESENTATIVES. A report showing distinctly the quantity and cost of all the stationery used by the House and the Clerk's office.	House Journal.	495	Commencement of the session.
1832, May 31	<i>Annual.</i> BY THE CORPORATION OF WASHINGTON. A statement of the cost of the Washington canal, with the annual expenditures and receipts from the canal.	Statutes at Large, volume 4.	523	In January.

LIST OF REPORTS—Continued.

Date of the law or resolution.	Officer, and nature of the report.	By what authority.	Page.	When expected to be made.
1862, July 2	BY THE GOVERNORS OF THE SEVERAL STATES. Report of the sales made of the scrip sold for the benefit of colleges for the promotion of agriculture and the mechanic arts and the amount received. BY THE MARSHAL OF THE DISTRICT OF COLUMBIA.	Statutes at Large, volume 12.	505	During the session.
1861, Dec. 9	A report of the authority by which he receives slaves into the jail of the District at the request of their masters, and holds them in confinement until discharged by their masters. BY THE BOARD OF MANAGERS OF THE MILITARY AND NAVAL ASYLUM FOR THE RELIEF OF TOTALLY DISABLED OFFICERS AND MEN OF THE VOLUNTEER FORCES OF THE UNITED STATES.	Senate Journal.	29	No time specified.
1866, March 21	A report of the condition of the asylum BY THE COMMISSIONER APPOINTED UNDER THE ACT TO PROVIDE FOR THE REVISION AND CONSOLIDATION OF THE STATUTE LAWS OF THE UNITED STATES.	Statutes at Large, 1st session 39th Congress.	11	First Monday in January.
1866, June 27	A report of their progress and doings, and when revised	Statutes at Large,	75	No time specified.

1866, July	26	and consolidated, to be reported as soon as practicable, and the whole work closed without unnecessary delay. BY THE CHESAPEAKE BAY AND POTOMAC RIVER TIDEWATER CANAL COMPANY.	1st session 39th Congress.	254	No time specified.
		A report of their receipts and expenditures on said extension, with a statement of the clear profits thereof. BY THE SUPERINTENDENT OF PUBLIC PRINTING.	Statutes at Large, 1st session 39th Congress.		
1866, July	27	A report to the Joint Committee on Printing of estimates of the quantity of paper of all descriptions which will, in his opinion, be required for the execution of the public printing during the coming year; and also to include in his annual report a detailed statement of all proposals made and contracts entered into for the purchase of paper.	Statutes at Large, 1st session 39th Congress.	305	No time specified.

LIST OF REPORTS—Continued.

CONTINGENT REPORTS.

If a transfer of the appropriations made for any of the departments or branches of the government shall have been made, by order of the President of the United States, during the recess of Congress, it is made the duty of the head of the department in which such transfer shall have been made to report to Congress, during the first week of the session, a special account of the moneys thus transferred, with their application.

See act 3d March, 1809, Statutes at Large, vol. 2, p. 535.

See act 3d March, 1817, Statutes at Large, vol. 3, p. 390.

See act 1st May, 1820, Statutes at Large, vol. 3, p. 568.

See act 30th June, 1834, Statutes at Large, vol. 4, p. 742.

LIST OF REPORTS—Continued.

If any State refuse to cede to the United States jurisdiction over the lands purchased by the United States for public purposes, the head of the executive department making the application is directed immediately to report the same to Congress.

Statutes at Large, vol. 5, p. 468.

The several heads of departments, in communicating estimates of appropriations and expenditures to Congress, or to committees of Congress, are required to specify the sources from which the estimates are derived, with the calculations upon which founded, and to discriminate between such as are conjectural and such as are framed upon specific information; also to specify the laws, treaties, or other authority for the expenditure.

If the head of a department consolidate appropriations "for the contingencies of his department and its several bureaus," he shall, in his annual report to be made to Congress, state the portion of it expended for the department proper, and for each bureau.

Statutes at Large, vol. 5, p. 686.

If, in submitting to Congress the annual estimates from the several executive departments of the government, it shall be found that the usual items of such estimates vary materially in amount from the appropriations ordinarily asked for the object named, and especially from the appropriation granted for the same objects for the year next preceding, and whenever new items not theretofore usual shall be introduced into such estimates for any year, the estimates shall be accompanied by minute and full explanations, from the head of the appropriate department, of all such variations and new items, setting forth the reasons and grounds upon which the amounts are required, and the different items added; and whenever any such estimate, whether annual or special, shall ask an appropriation for any new specific expenditure, such as the construction of a fort, the erection of a custom-house or other public building, or the construction of any other public work requiring a plan before the building or work can be properly completed, every such estimate shall be accompanied by a full plan and detailed estimates of the cost of the whole work; and all subsequent estimates for every such work shall give the original estimated cost, the aggregate amount theretofore appropriated for the same, and the amount actually expended thereupon, as well as the amount asked for the current year for which such estimates shall be made; and whenever any such subsequent estimate shall ask for an appropriation for any such work beyond the original estimate of the cost, the full reasons for the excess, and the extent of the anticipated excess, shall be also stated.

See Statutes at Large, vol. 5, p. 693.

LIST OF THE MEMBERS
OF THE
HOUSE OF REPRESENTATIVES OF THE UNITED STATES,
AND THEIR PLACES OF RESIDENCE,
DURING THE
THIRTY-NINTH CONGRESS, SECOND SESSION,
COMMENCING MONDAY, DECEMBER 3, 1866.

MAINE.

1. John Lynch Portland.
2. Sidney Perham Paris.
3. James G. Blaine Augusta.
4. John H. Rice Foxcroft.
5. Frederick A. Pike Calais.

NEW HAMPSHIRE.

1. Gilman Marston Exeter.
2. Edward H. Rollins Concord.
3. James W. Patterson Hanover.

VERMONT.

1. Frederick E. Woodbridge Vergennes.
2. Justin S. Morrill Strafford.
3. Portus Baxter Derby Line.

MASSACHUSETTS.

1. Thomas D. Eliot New Bedford.
2. Oakes Ames North Easton.
3. Alexander H. Rice Boston.
4. Samuel Hooper Boston.
5. John B. Alley Lynn.
6. Nathaniel P. Banks Waltham.
7. George S. Boutwell Groton.
8. John D. Baldwin Worcester.
9. William B. Washburn Greenfield.
10. Henry L. Dawes Pittsfield.

RHODE ISLAND.

1. Thomas A. Jenckes Providence
2. Nathan F. Dixon Westerly.

CONNECTICUT.

1. Henry C. Deming.....Hartford.
2. Samuel L. Warner.....Middletown.
3. Augustus Brandegee.....New London.
4. John H. Hubbard.....Litchfield.

NEW YORK.

1. Stephen Taber.....Roslyn.
2. Teunis G. Bergen.....New Utrecht.
3. John W. Hunter.....Brooklyn.
4. Morgan Jones.....New York.
5. Nelson Taylor.....New York.
6. Henry J. Raymond.....New York.
7. John W. Chanler.....New York.
8. William E. Dodge.....New York.
9. William A. Darling.....New York.
10. William Radford.....Yonkers.
11. Charles H. Winfield.....Goshen.
12. John H. Ketcham.....Dover.
13. Edwin N. Hubbell.....Coxsackie.
14. Charles Goodyear.....Schoharie.
15. John A. Griswold.....Troy.
16. Robert S. Hale.....Elizabethtown.
17. Calvin T. Hulburd.....Brasher Falls.
18. James M. Marvin.....Saratoga Springs.
19. Demas Hubbard, jr.....Smyrna.
20. Addison H. Laflin.....Herkimer.
21. Roscoe Conkling.....Utica.
22. Sydney T. Holmes.....Morrisville.
23. Thomas T. Davis.....Syracuse.
24. Theodore M. Pomeroy.....Auburn.
25. Daniel Morris.....Penn Yan.
26. Giles W. Hotchkiss.....Binghamton.
27. Hamilton Ward.....Belmont.
28. Roswell Hart.....Rochester.
29. Burt Van Horn.....Newfane.
30. James M. Humphrey.....Buffalo.
31. Henry Van Aernam.....Franklinville.

NEW JERSEY.

1. John F. Starr.....Camden.
2. William A. Newell.....Allentown.
3. Charles Sitgreaves.....Philipsburg.
4. Andrew J. Rogers.....Newton.
5. Edwin R. V. Wright.....Hudson City.

PENNSYLVANIA.

1. Samuel J. Randall.....Philadelphia.
2. Charles O'Neill.....Philadelphia.
3. Leonard Myers.....Philadelphia.
4. William D. Kelley.....Philadelphia.
5. M. Russell Thayer.....Chestnut Hill, Philadelphia.

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|-----|----------------------------|-------------------|
| 6. | Benjamin M. Boyer | Norristown. |
| 7. | John M. Broomall | Media. |
| 8. | Sydenham E. Ancona | Reading. |
| 9. | Thaddeus Stevens | Lancaster. |
| 10. | Myer Strouse | Pottsville. |
| 11. | | |
| 12. | Charles Denison | Wilkesbarre. |
| 13. | Ulysses Mercur | Towanda. |
| 14. | George F. Miller | Lewisburg. |
| 15. | Adam J. Glossbrenner | York. |
| 16. | William H. Koontz | Somerset. |
| 17. | Abraham A. Barker | Ebensburg. |
| 18. | Stephen F. Wilson | Wellsboro'. |
| 19. | Glenni W. Scofield | Warren. |
| 20. | Charles V. Culver | Franklin. |
| 21. | John L. Dawson | Brownsville. |
| 22. | James K. Moorhead .. | Pittsburg. |
| 23. | Thomas Williams | Pittsburg. |
| 24. | George V. Lawrence | Monongahela City. |

DELAWARE.

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|----|-------------------------|--------|
| 1. | John A. Nicholson | Dover. |
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MARYLAND.

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| 1. | Hiram McCullough | Elkton. |
| 2. | John L. Thomas, jr. | Baltimore. |
| 3. | Charles E. Phelps | Baltimore. |
| 4. | Francis Thomas | Frankville. |
| 5. | Benjamin G. Harris | Leonardtwn. |

VIRGINIA.

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- 4.
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NORTH CAROLINA

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SOUTH CAROLINA.

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GEORGIA.

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ALABAMA.

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MISSISSIPPI.

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LOUISIANA.

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- 5.

OHIO.

- | | |
|------------------------------|----------------|
| 1. Benjamin Eggleston..... | Cincinnati. |
| 2. Rutherford B. Hayes | Cincinnati. |
| 3. Robert C. Schenck | Dayton. |
| 4. William Lawrence..... | Bellefontaine. |
| 5. Francis C. LeBlond..... | Celina. |
| 6. Reader W. Clarke | Batavia. |
| 7. Samuel Shellabarger..... | Springfield. |
| 8. James R. Hubbell..... | Delaware. |
| 9. Ralph P. Buckland..... | Frémont. |
| 10. James M. Ashley | Toledo. |
| 11. Hezekiah S. Bundy | Reed's Mills. |
| 12. William E. Fink..... | Somerset. |
| 13. Columbus Delano..... | Mount Vernon. |
| 14. Martin Welker..... | Wooster. |
| 15. Tobias A. Plants..... | Pomeroy. |
| 16. John A. Bingham..... | Cadiz. |
| 17. Ephraim R. Eckley..... | Carrollton. |
| 18. Rufus P. Spalding..... | Cleveland. |
| 19. James A. Garfield..... | Hiram. |

KENTUCKY.

1. Lawrence S. Trimble Paducah.
2. Burwell C. Ritter Hopkinsville.
3. Elijah Hise Russellville, Logan county.
4. Aaron Harding Greensburg.
5. Lovell H. Rousseau Louisville.
6. Andrew H. Ward Cynthiana.
7. George S. Shanklin Nicholasville.
8. William H. Randall London.
9. Samuel McKee Mount Sterling.

TENNESSEE.

1. Nathaniel J. Taylor Happy Valley.
2. Horace Maynard Knoxville.
3. William B. Stokes Liberty.
4. Edmund Cooper Shelbyville.
5. William B. Campbell Lebanon.
6. Samuel M. Arnell Columbia.
7. Isaac R. Hawkins Huntingdon.
8. John W. Leftwich Memphis.

INDIANA.

1. William E. Niblack Vincennes.
2. Michael C. Kerr New Albany.
3. Ralph Hill Columbus.
4. John H. Farquhar Brookville.
5. George W. Julian Centreville.
6. Ebenezer Dumont Indianapolis.
7. Henry D. Washburn Clinton.
8. Godlove S. Orth Lafayette.
9. Schuyler Colfax South Bend.
10. Joseph H. Defrees Goshen.
11. Thomas N. Stillwell Anderson.

ILLINOIS.

1. John Wentworth Chicago.
2. John F. Farnsworth St. Charles.
3. Ellihu B. Washburne Galena.
4. Abner C. Harding Monmouth.
5. Ebon C. Ingersoll Peoria.
6. Burton C. Cook Ottawa.
7. Henry P. H. Bromwell Charleston.
8. Shelby M. Cullom Springfield.
9. Lewis W. Ross Lewiston.
10. Anthony Thornton Shelbyville.
11. Samuel S. Marshall McLeansboro'.
12. Jehu Baker Belleville.
13. Andrew J. Kuykendall Vienna.
- At large. Samuel W. Moulton Shelbyville.

MISSOURI.

1. John Hogan St. Louis.
2. Henry T. Blow St. Louis.
3. Thomas E. Noell Perryville.

- | | |
|----------------------------|--------------|
| 4. John R. Kelso..... | Springfield. |
| 5. Joseph W. McClurg..... | Linn Creek. |
| 6. Robert T. Van Horn..... | Kansas City. |
| 7. Benjamin F. Loan..... | St. Joseph. |
| 8. John F. Benjamin..... | Shelbyville. |
| 9. George W. Anderson..... | Louisiana. |

ARKANSAS.

- 1.
- 2.
- 3.

MICHIGAN.

- | | |
|-------------------------------|---------------|
| 1. Fernando C. Beaman..... | Adrian. |
| 2. Charles Upson..... | Coldwater. |
| 3. John W. Longyear..... | Lansing. |
| 4. Thomas W. Ferry..... | Grand Haven |
| 5. Rowland E. Trowbridge..... | Birmingham. |
| 6. John F. Driggs..... | East Saginaw. |

FLORIDA.

- 1.

TEXAS.

- 1.
- 2.
- 3.
- 4.

IOWA.

- | | |
|----------------------------|-------------|
| 1. James F. Wilson..... | Fairfield. |
| 2. Hiram Price..... | Davenport. |
| 3. William B. Allison..... | Dubuque. |
| 4. Josiah B. Grinnell..... | Grinnell. |
| 5. John A. Kasson..... | Des Moines. |
| 6. Asahel W. Hubbard..... | Sioux City. |

WISCONSIN.

- | | |
|-----------------------------|----------------|
| 1. Halbert E. Paine..... | Milwaukee. |
| 2. Ithamar C. Sloan..... | Janesville. |
| 3. Amasa Cobb..... | Mineral Point. |
| 4. Charles A. Eldridge..... | Fond du Lac. |
| 5. Philetus Sawyer..... | Oshkosh. |
| 6. Walter D. McIndoe..... | Warsaw. |

CALIFORNIA.

- | | |
|--------------------------|----------------|
| 1. Daniel C. McRuer..... | San Francisco. |
| 2. William Higby..... | Calaveras. |
| 3. John Bidwell..... | Chico. |

MINNESOTA.

- | | |
|---------------------------|-----------|
| 1. William Windom..... | Winona. |
| 2. Ignatius Donnelly..... | Hastings. |

OREGON.

1. James H. D. Henderson.....Eugene City.

KANSAS.

1. Sidney Clarke.....Lawrence.

WEST VIRGINIA.

1. Chester D. Hubbard.....Wheeling.
2. George R. Latham.....Grafton.
3. Kellian V. Whaley.....Point Pleasant.

NEVADA.

1. Delos R. Ashley.....Virginia City.

DELEGATES FROM THE TERRITORIES.

NEW MEXICO.

1. J. Francisco Chaves.....Sante Fé.

UTAH.

1. William H. Hooper.....Salt Lake City.

WASHINGTON.

1. Arthur A. Denny.....Seattle.

NEBRASKA.

1. Phineas W. Hitchcock.....Omaha.

COLORADO.

1. Allen A. Bradford.....Denver.

DAKOTA.

1. Walter A. Burleigh.....Yancton.

ARIZONA.

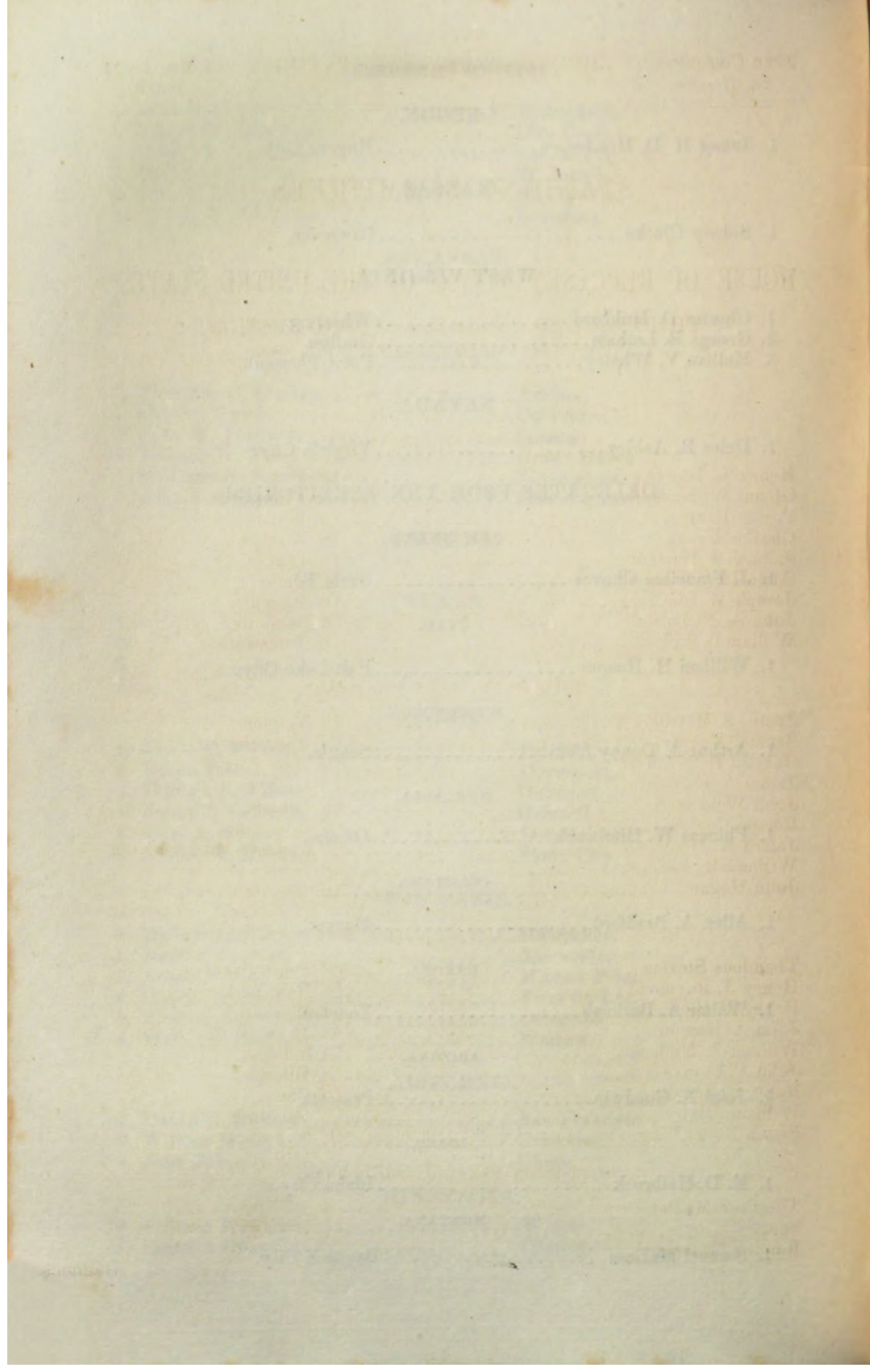
1. John N. Goodwin.....Prescott.

IDAHO.

1. E. D. Holbrook.....Idaho City.

MONTANA.

1. Samuel McLean.....Bannock City.



STANDING COMMITTEES

OF THE

HOUSE OF REPRESENTATIVES OF THE UNITED STATES.

THIRTY-NINTH CONGRESS, SECOND SESSION,

COMMENCING MONDAY, DECEMBER 3, 1866.

COMMITTEE OF ELECTIONS.

Henry L. Dawes.....	Of Massachusetts.
Glenni W. Scofield.....	Of Pennsylvania.
Portus Baxter.....	Of Vermont.
Charles Upson.....	Of Michigan.
Samuel S. Marshall.....	Of Illinois.
Samuel Shellabarger.....	Of Ohio.
Joseph W. McClurg.....	Of Missouri.
John A. Nicholson.....	Of Delaware.
William B. Stokes.....	Of Tennessee.

COMMITTEE OF WAYS AND MEANS.

Justin S. Morrill.....	Of Vermont.
Samuel Hooper.....	Of Massachusetts.
Charles H. Winfield.....	Of New York.
James A. Garfield.....	Of Ohio.
John Wentworth.....	Of Illinois.
Roscoe Conkling.....	Of New York.
James K. Moorhead.....	Of Pennsylvania.
William B. Allison.....	Of Iowa.
John Hogan.....	Of Missouri.

COMMITTEE ON APPROPRIATIONS.

Thaddeus Stevens.....	Of Pennsylvania.
Henry J. Raymond.....	Of New York.
Henry T. Blow.....	Of Missouri.
John A. Kasson.....	Of Iowa.
William E. Niblack.....	Of Indiana.
John F. Farnsworth.....	Of Illinois.
Rufus P. Spalding.....	Of Ohio.
William Higby.....	Of California.
Edwin R. V. Wright.....	Of New Jersey.

COMMITTEE ON BANKING AND CURRENCY.

Theodore M. Pomeroy.....	Of New York.
Samuel Hooper.....	Of Massachusetts.
Ralph P. Buckland.....	Of Ohio.

Aaron Harding	Of Kentucky
John Lynch	Of Maine.
Joseph H. Defrees	Of Indiana.
Chester D. Hubbard	Of West Virginia.
Samuel J. Randall	Of Pennsylvania.
John W. Hunter	Of New York.

COMMITTEE ON THE PACIFIC RAILROAD.

Hiram Price	Of Iowa.
Thaddeus Stevens	Of Pennsylvania.
Ignatius Donnelly	Of Minnesota,
Oakes Ames	Of Massachusetts.
Edwin N. Hubbell	Of New York.
Benjamin F. Loan	Of Missouri.
Sidney Clarke	Of Kansas.
John Bidwell	Of California.
James H. D. Henderson	Of Oregon.

COMMITTEE OF CLAIMS.

Columbus Delano	Of Ohio.
Giles W. Hotchkiss	Of New York.
William B. Washburn	Of Massachusetts.
Ithamar C. Sloan	Of Wisconsin.
Henry D. Washburn	Of Indiana.
Samuel McKee	Of Kentucky.
Hamilton Ward	Of New York.
Abraham A. Barker	Of Pennsylvania.
Anthony Thornton	Of Illinois.

COMMITTEE ON COMMERCE.

Ellihu B. Washburne	Of Illinois.
Thomas D. Eliot	Of Massachusetts.
Nathan F. Dixon	Of Rhode Island.
Charles O'Neill,	Of Pennsylvania.
John W. Longyear	Of Michigan.
William E. Dodge	Of New York.
John L. Thomas, jr.	Of Maryland.
Benjamin Eggleston	Of Ohio.
James M. Humphrey	Of New York.

COMMITTEE ON THE PUBLIC LANDS.

George W. Julian	Of Indiana.
John F. Driggs	Of Michigan.
Adam J. Glossbrenner	Of Pennsylvania.
Ignatius Donnelly	Of Minnesota.
Ephraim R. Eckley	Of Ohio.
Sidney T. Holmes	Of New York.
Donald C. McRuer	Of California.
George W. Anderson	Of Missouri.
Stephen Taber	Of New York.

COMMITTEE ON THE POST OFFICE AND POST ROADS.

John B. Alley	Of Massachusetts
John H. Farquhar	Of Indiana.

William E. Finck	Of Ohio.
Donald C. McRuer	Of California.
Thomas W. Ferry	Of Michigan.
Andrew J. Kuykendall	Of Illinois.
Demas Hubbard, jr.	Of New York.
John R. Kelso	Of Missouri.
William B. Campbell	Of Tennessee.

COMMITTEE FOR THE DISTRICT OF COLUMBIA.

Ebon C. Ingersoll	Of Illinois.
Ebenezer Dumont	Of Indiana.
John D. Baldwin	Of Massachusetts.
Hiram McCullough	Of Maryland.
Martin Welker	Of Ohio.
Ulysses Mercur	Of Pennsylvania.
George S. Shanklin	Of Kentucky.
Horace Maynard	Of Tennessee.
William H. Koontz	Of Pennsylvania.

COMMITTEE ON THE JUDICIARY.

James F. Wilson	Of Iowa.
George S. Boutwell	Of Massachusetts.
Francis Thomas	Of Maryland.
Thomas Williams	Of Pennsylvania.
Frederick E. Woodbridge	Of Vermont.
Daniel Morris	Of New York.
Andrew J. Rogers	Of New Jersey.
William Lawrence	Of Ohio.
Burton C. Cook	Of Illinois.

COMMITTEE ON REVOLUTIONARY CLAIMS.

Kellian V. Whaley	Of West Virginia.
William A. Newell	Of New Jersey.
Charles A. Eldridge	Of Wisconsin.
John L. Thomas, jr.	Of Maryland.
Stephen F. Wilson	Of Pennsylvania.
Burt Van Horn	Of New York.
Reader W. Clarke	Of Ohio.
Rowland E. Trowbridge	Of Michigan.
Lawrence S. Trimble	Of Kentucky.

COMMITTEE ON PUBLIC EXPENDITURES.

Calvin T. Hulburd	Of New York.
John M. Broomall	Of Pennsylvania.
Asahel W. Hubbard	Of Iowa.
Edward H. Rollins	Of New Hampshire.
Morgan Jones	Of New York.
Samuel L. Warner	Of Connecticut.
Tobias A. Plants	Of Ohio.
John A. Nicholson	Of Delaware.
Samuel M. Arnell	Of Tennessee.

LIST OF STANDING COMMITTEES.

COMMITTEE ON PRIVATE LAND CLAIMS.

M. Russell Thayer.....	Of Pennsylvania
Giles W. Hotchkiss.....	Of New York.
Jehu Baker.....	Of Illinois.
Rutherford B. Hayes.....	Of Ohio.
Charles Goodyear.....	Of New York.
Thomas E. Noell.....	Of Missouri.
Frederick E. Woodbridge.....	Of Vermont.
Michael C. Kerr.....	Of Indiana.
Benjamin G. Harris.....	Of Maryland.

COMMITTEE ON MANUFACTURES.

James K. Moorhead.....	Of Pennsylvania,
Oakes Ames.....	Of Massachusetts.
Hezekiah S. Bundy.....	Of Ohio.
Lawrence S. Trimble.....	Of Kentucky.
Robert S. Hale.....	Of New York.
Abner C. Harding.....	Of Illinois.
Philetus Sawyer.....	Of Wisconsin.
Chester D. Hubbard.....	Of West Virginia.
Edwin N. Hubbell.....	Of New York.

COMMITTEE ON AGRICULTURE.

John Bidwell.....	Of California.
Josiah B. Grinnell.....	Of Iowa.
Thomas N. Stillwell.....	Of Indiana.
Portus Baxter.....	Of Vermont.
James R. Hubbell.....	Of Ohio.
Burwell C. Ritter.....	Of Kentucky.
Rowland E. Trowbridge.....	Of Michigan.
George V. Lawrence.....	Of Pennsylvania.
Teunis G. Bergen.....	Of New York.

COMMITTEE ON INDIAN AFFAIRS.

William Windom.....	Of Minnesota.
Walter D. McIndoe.....	Of Wisconsin.
Charles Denison.....	Of Pennsylvania.
Asahel W. Hubbard.....	Of Iowa.
Sidney Clarke.....	Of Kansas.
Roswell Hart.....	Of New York
Lewis W. Ross.....	Of Illinois.
James H. D. Henderson.....	Of Oregon.
Robert T. Van Horn.....	Of Missouri.

COMMITTEE ON MILITARY AFFAIRS.

Robert C. Schenck.....	Of Ohio.
Henry C. Deming.....	Of Connecticut.
Gilman Marston.....	Of New Hampshire
Lovell H. Rousseau.....	Of Kentucky.
John A. Bingham.....	Of Ohio.
Sydenham E. Ancona.....	Of Pennsylvania.

John H. Ketcham.....	Of New York.
James G. Blaine.....	Of Maine.
Charles Sitgreaves.....	Of New Jersey

COMMITTEE ON THE MILITIA.

Abner C. Harding.....	Of Illinois.
Ralph P. Buckland.....	Of Ohio.
Thomas E. Noell.....	Of Missouri.
Charles E. Phelps.....	Of Maryland.
Halbert E. Paine.....	Of Wisconsin.
Isaac R. Hawkins.....	Of Tennessee.
A. H. Ward.....	Of Kentucky.
Nathaniel P. Banks.....	Of Massachusetts.
Henry Van Aernam.....	Of New York.

COMMITTEE ON NAVAL AFFAIRS.

Alexander H. Rice.....	Of Massachusetts.
John A. Griswold.....	Of New York.
Frederick A. Pike.....	Of Maine.
William D. Kelley.....	Of Pennsylvania.
Augustus Brandegee.....	Of Connecticut.
Charles A. Eldridge.....	Of Wisconsin.
Charles E. Phelps.....	Of Maryland.
William A. Darling.....	Of New York.
Francis C. LeBlond.....	Of Ohio.

COMMITTEE ON FOREIGN AFFAIRS.

Nathaniel P. Banks.....	Of Massachusetts.
Henry J. Raymond.....	Of New York.
Godlove S. Orth.....	Of Indiana.
William H. Randall.....	Of Kentucky.
John L. Dawson.....	Of Pennsylvania.
James W. Patterson.....	Of New Hampshire
William A. Newell.....	Of New Jersey.
Shelby M. Cullom.....	Of Illinois.
William E. Dodge.....	Of New York.

COMMITTEE ON THE TERRITORIES.

James M. Ashley.....	Of Ohio.
Fernando C. Beaman.....	Of Michigan.
John H. Rice.....	Of Maine.
James M. Marvin.....	Of New York.
Myer Strouse.....	Of Pennsylvania.
Ralph Hill.....	Of Indiana.
Samuel W. Moulton.....	Of Illinois.
John F. Starr.....	Of New Jersey.
Edmund Cooper.....	Of Tennessee.

COMMITTEE ON REVOLUTIONARY PENSIONS.

Walter D. McIndoe.....	Of Wisconsin
Hiram Price.....	Of Iowa.
Benjamin M. Boyer.....	Of Pennsylvania

LIST OF STANDING COMMITTEES.

Charles Goodyear	Of New York.
Charles Upson	Of Michigan.
Augustus Brandegee	Of Connecticut.
William B. Washburn	Of Massachusetts.
Martin Welker	Of Ohio.
Sidney T. Holmes	Of New York.

COMMITTEE ON INVALID PENSIONS.

Sidney Perham	Of Maine.
Thomas N. Stillwell	Of Indiana.
Nelson Taylor	Of New York.
Henry Van Aernam	Of New York.
George V. Lawrence	Of Pennsylvania.
Philetus Sawyer	Of Wisconsin.
John F. Benjamin	Of Missouri.
Aaron Harding	Of Kentucky.
John H. Leftwich	Of Tennessee.

COMMITTEE ON ROADS AND CANALS.

Fernando C. Beaman	Of Michigan.
Burt Van Horn	Of New York.
John H. Hubbard	Of Connecticut.
John Wentworth	Of Illinois.
Thomas T. Davis	Of New York.
George F. Miller	Of Pennsylvania.
Joseph H. Defrees	Of Indiana.
William E. Finck	Of Ohio.
Lovell H. Rousseau	Of Kentucky.

COMMITTEE ON MINES AND MINING.

William Higby	Of California.
Delos R. Ashley	Of Nevada.
Amasa Cobb	Of Wisconsin.
Myer Strouse	Of Pennsylvania.
John F. Driggs	Of Michigan.
James M. Ashley	Of Ohio.
James H. D. Henderson	Of Oregon.
Thomas E. Noell	Of Missouri.
Nathaniel G. Taylor	Of Tennessee.

COMMITTEE ON FREEDMEN'S AFFAIRS.

Thomas D. Eliot	Of Massachusetts.
William D. Kelley	Of Pennsylvania.
Godlove S. Orth	Of Indiana.
John A. Bingham	Of Ohio.
Nelson Taylor	Of New York.
Benjamin F. Loan	Of Missouri.
Josiah B. Grinnell	Of Iowa.
Halbert E. Paine	Of Wisconsin.
Samuel S. Marshall	Of Illinois.

COMMITTEE ON PATENTS.

Thomas A. Jenckes.....	Of Rhode Island.
Leonard Myers.....	Of Pennsylvania.
John W. Chanler.....	Of New York.
John H. Hubbard.....	Of Connecticut.
Henry P. H. Bromwell.....	Of Illinois.

COMMITTEE ON PUBLIC BUILDINGS AND GROUNDS.

John H. Rice.....	Of Maine.
John F. Starr.....	Of New Jersey.
Stephen F. Wilson.....	Of Pennsylvania.
Francis C. LeBlond,	Of Ohio.
George R. Latham.....	Of West Virginia.

COMMITTEE ON REVISAL AND UNFINISHED BUSINESS.

Glenni W. Scofield.....	Of Pennsylvania.
James F. Wilson.....	Of Iowa.
James M. Ashley.....	Of Ohio.
Alexander H. Rice.....	Of Massachusetts.
Theodore M. Pomeroy.....	Of New York.

COMMITTEE ON MILEAGE.

George W. Anderson.....	Of Missouri.
Gilman Marston.....	Of New Hampshire.
Tobias A. Plants.....	Of Ohio.
Andrew J. Kuykendall.....	Of Illinois.
Andrew H. Ward.....	Of Kentucky.

COMMITTEE ON ACCOUNTS.

Edward H. Rollins.....	Of New Hampshire.
John M. Broomall.....	Of Pennsylvania.
Ephraim R. Eckley	Of Ohio.
Michael C. Kerr.....	Of Indiana.
Hamilton Ward.....	Of New York.

COMMITTEE ON COINAGE, WEIGHTS, AND MEASURES.

John A. Kasson.....	Of Iowa.
Charles H. Winfield.....	Of New York.
Thomas Williams.....	Of Pennsylvania.
Hezekiah S. Bundy.....	Of Ohio.
Henry L. Dawes.....	Of Massachusetts.

COMMITTEE ON EXPENDITURES IN THE STATE DEPARTMENT.

Frederick A. Pike	Of Maine.
Henry P. H. Bromwell	Of Illinois.
Samuel J. Randall	Of Pennsylvania.
Roswell Hart	Of New York.
Samuel Shellabarger	Of Ohio.

COMMITTEE ON EXPENDITURES IN THE TREASURY DEPARTMENT.

James M. Marvin	Of New York.
Charles V. Culver.....	Of Pennsylvania.
Ralph Hill.....	Of Indiana.
Shelby M. Cullom.....	Of Illinois.
Burwell C. Ritter	Of Kentucky.

COMMITTEE ON EXPENDITURES IN THE WAR DEPARTMENT.

Henry C. Deming.....	Of Connecticut.
Ithamar C. Sloan	Of Wisconsin.
George F. Miller.....	Of Pennsylvania.
Edwin N. Hubbell	Of New York.
James R. Hubbell.....	Of Ohio.

COMMITTEE ON EXPENDITURES IN THE NAVY DEPARTMENT.

George W. Julian.....	Of Indiana.
Samuel W. Moulton.....	Of Illinois.
Samuel L. Warner	Of Connecticut.
Charles Denison	Of Pennsylvania.
John W. Hunter.....	Of New York.

COMMITTEE ON EXPENDITURES IN THE POST OFFICE DEPARTMENT.

Jehu Baker.....	Of Illinois.
Leonard Myers.....	Of Pennsylvania.
William A. Darling	Of New York.
Benjamin Eggleston.....	Of Ohio.
Andrew J. Rogers	Of New Jersey.

COMMITTEE ON EXPENDITURES IN THE INTERIOR DEPARTMENT.

Ebenezer Dumont.....	Of Indiana.
Myer Strouse	Of Pennsylvania.
John F. Benjamin	Of Missouri.
William B. Allison.....	Of Iowa.
Samuel McKee	Of Kentucky.

COMMITTEE ON EXPENDITURES ON THE PUBLIC BUILDINGS.

John W. Longyear	Of Michigan.
John D. Baldwin	Of Massachusetts.
Nathan F. Dixon	Of Connecticut.
Philip Johnson.....	Of Pennsylvania.
William H. Randall.....	Of Kentucky.

JOINT COMMITTEES.

COMMITTEE ON THE LIBRARY.

On the part of the Senate.

Timothy O. Howe	Of Wisconsin.
William P. Fessenden	Of Maine.
Jacob M. Howard.....	Of Michigan.

On the part of the House of Representatives

Rutherford B. Hayes.....	Of Ohio.
William D. Kelley.....	Of Pennsylvania.
Calvin T. Hulburd.....	Of New York.

COMMITTEE ON PRINTING.

On the part of the Senate.

Henry B. Anthony.....	Of Rhode Island.
B. Gratz Brown.....	Of Missouri.
George R. Riddle.....	Of Delaware.

On the part of the House of Representatives.

Addison H. Laflin.....	Of New York.
Reader W. Clarke.....	Of Ohio.
George R. Latham.....	Of West Virginia

COMMITTEE ON ENROLLED BILLS.

On the part of the Senate.

James W. Nye.....	Of Nevada.
Timothy O. Howe.....	Of Wisconsin.
Edgar Cowan.....	Of Pennsylvania.

On the part of the House of Representatives.

Amasa Cobb.....	Of Wisconsin.
Adam J. Glossbrenner.....	Of Pennsylvania.
Rowland E. Trowbridge.....	Of Michigan.

REGENTS OF THE SMITHSONIAN INSTITUTION.

On the part of the Senate.

Lyman Trumbull.....	Of Illinois.
Garrett Davis.....	Of Kentucky.
William P. Fessenden.....	Of Maine.

On the part of the House of Representatives from and after December 27, 1865.

James W. Patterson.....	Of New Hampshire.
John F. Farnsworth.....	Of Illinois.
James A. Garfield.....	Of Ohio.

COMMITTEE ON RECONSTRUCTION.

On the part of the Senate.

William P. Fessenden.....	Of Maine.
James W. Grimes.....	Of Iowa.

Ira Harris.....	Of New York.
Jacob M. Howard.....	Of Michigan.
Reverdy Johnson.....	Of Maryland.
George H. Williams.....	Of Oregon.

On the part of the House of Representatives.

Thaddeus Stevens.....	Of Pennsylvania.
Justin S. Morrill.....	Of Vermont.
John A. Bingham.....	Of Ohio.
Roscoe Conkling.....	Of New York.
George S. Boutwell.....	Of Massachusetts.
Henry T. Blow.....	Of Missouri.
Andrew J. Rogers.....	Of New Jersey.
Elijah Hise.....	Of Kentucky.
John F. Farnsworth.....	Of Illinois.

SELECT COMMITTEES.

COMMITTEE ON THE RULES.

The Speaker.	
Ellihu B. Washburne.....	Of Illinois.
Nathaniel P. Banks.....	Of Massachusetts.
John L. Dawson.....	Of Pennsylvania.
Henry J. Raymond.....	Of New York.

COMMITTEE ON WAR DEBTS OF LOYAL STATES.

James G. Blaine.....	Of Maine.
Samuel Hooper.....	Of Massachusetts.
Benjamin F. Loan.....	Of Missouri.
Benjamin M. Boyer.....	Of Pennsylvania.
William A. Darling.....	Of New York.
Tobias A. Plants.....	Of Ohio.
William A. Newell.....	Of New Jersey.
Thomas W. Ferry.....	Of Michigan.
Isaac R. Hawkins.....	Of Tennessee.

COMMITTEE ON CIVIL SERVICE OF THE UNITED STATES.

Thomas A. Jenckes.....	Of Rhode Island.
Samuel Shellabarger.....	Of Ohio.
John Hogan.....	Of Missouri.
Leonard Myers.....	Of Pennsylvania.
Samuel McKee.....	Of Kentucky.
James M. Humphrey.....	Of New York.
Henry P. H. Bromwell.....	Of Illinois.

JOINT COMMITTEE ON RETRENCHMENT.

On the part of the Senate.

George F. Edmunds.....	Of Vermont.
George H. Williams.....	Of Oregon.
Charles R. Buckalew.....	Of Pennsylvania.

On the part of the House of Representatives.

Robert S. Hale.....	Of New York.
Robert C. Schenck.....	Of Ohio.
Thomas A. Jenckes.....	Of Rhode Island.
Samuel J. Randall.....	Of Pennsylvania.
John L. Thomas.....	Of Maryland.

COMMITTEE ON THE VENTILATION OF THE HALL.

Henry J. Raymond.....	Of New York.
Thaddeus Stevens.....	Of Pennsylvania.
Henry L. Dawes.....	Of Massachusetts.
Columbus Delano.....	Of Ohio.
John A. Nicholson.....	Of Delaware.

COMMITTEE ON NEW ORLEANS RIOTS.

Thomas D. Eliot.....	Of Massachusetts.
Samuel Shellabarger.....	Of Ohio.
Benjamin M. Boyer.....	Of Pennsylvania.

COMMITTEE ON MURDER OF UNITED STATES SOLDIERS IN SOUTH CAROLINA.

Frederick A. Pike.....	Of Maine.
John F. Farnsworth.....	Of Illinois.
Edmund Cooper.....	Of Tennessee.

COMMITTEE ON SOUTHERN RAILROADS.

Horace Maynard.....	Of Tennessee.
Joseph W. McClurg.....	Of Missouri.
Ulysses Mercur.....	Of Pennsylvania.
Henry D. Washburn.....	Of Indiana.
John W. Chanler.....	Of New York.

COMMITTEE ON FRAUDS IN INTERNAL REVENUE.

William A. Darling.....	Of New York.
Fernando C. Beaman.....	Of Michigan.
Benjamin Eggleston.....	Of Ohio.
Leonard Myers.....	Of Pennsylvania.
Lawrence S. Trimble.....	Of Kentucky.

COMMITTEE ON DORANCE ATWATER.

Robert S. Hale.....	Of New York.
Frederick E. Woodbridge.....	Of Vermont.
Anthony Thornton.....	Of Illinois.
Halbert E. Paine.....	Of Wisconsin.
John W. Longyear.....	Of Michigan.

COMMITTEE ON DIRECT TAXES AND FORFEITED LANDS.

Roscoe Conkling.....	Of New York.
Ignatius Donnelly.....	Of Minnesota.
Henry L. Dawes.....	Of Massachusetts.
Glenni W. Scofield.....	Of Pennsylvania.
Aaron Harding.....	Of Kentucky.

COMMITTEE ON FREE SCHOOLS IN THE DISTRICT OF COLUMBIA.

Thaddeus Stevens	Of Pennsylvania.
James W. Patterson	Of New Hampshire.
Martin Walker	Of Ohio.
George S. Boutwell	Of Massachusetts.
Samuel W. Moulton	Of Illinois.
Delos R. Ashley	Of Nevada.
Edwin N. Hubbell	Of New York.

EQUAL SUFFRAGE.

RESOLUTIONS

OF THE

LEGISLATURE OF VERMONT,

ON

The subject of equal suffrage.

DECEMBER 6, 1866.—Referred to the Committee on Reconstruction and ordered to be printed.

JOINT RESOLUTIONS relating to equal suffrage.

Resolved by the senate and house of representatives, That laws ought to be in force in all of the United States guaranteeing equal and impartial suffrage, without respect to color.

Resolved, That it is the duty of Congress to pass laws giving this right in all places where it can be done constitutionally.

Resolved, That we hereby request our senators and representatives in Congress to use their influence for the passage of a law giving equal and impartial suffrage in the District of Columbia, as early as possible at the next session of Congress.

JOHN W. STEWART,
Speaker of the House of Representatives.
A. B. GARDNER,
President of the Senate.

STATE OF VERMONT,
Office of Secretary of State.

I hereby certify that the foregoing is a true copy of joint resolutions adopted by the general assembly at its annual session, A. D. one thousand eight hundred and sixty-six, as appears from the files in this office.

In witness whereof, I hereunto subscribe my name and affix the seal of this
[SEAL.] office, at Northfield, this first day of December, A. D. one thousand eight hundred and sixty-six.

GEORGE NICHOLS,
Secretary of State.

LEGISLATURE OF VERMONT

REPORTS

The report of the Vermont Legislature for the year 1900, is hereby published in accordance with the provisions of the act of the Legislature of 1899, chapter 100, section 1, which provides that the report of the Legislature shall be printed and distributed to the several towns of the State.

JOHN W. KIRKLAND,
Speaker of the House of Representatives.

WILLIAM A. KIRKLAND,
President of the Senate.

Printed by the Vermont State Printer, Montpelier, Vermont.
1900.

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PROTECTION OF AMERICAN INDUSTRY.

RESOLUTIONS
OF THE
LEGISLATURE OF VERMONT,
RELATING TO

The protection of American industry.

DECEMBER 6, 1866.—Referred to the Committee of Ways and Means and ordered to be printed.

JOINT RESOLUTION relating to the protection of American industry.

Resolved by the senate and house of representatives, That it is the sense of the general assembly of the State of Vermont that an efficient system of protective duties is indispensably necessary to the best and permanent prosperity of the country.

Resolved, That it is the duty of the general government to protect the labor and industry of the country against foreign competition; and that the material interests developed by the wool-producers of Vermont demand that the protection in favor of wool in the tariff bill presented at the last session of Congress should receive its early attention and sanction.

Resolved, That our senators and representatives be requested at an early day of the next session to earnestly and faithfully urge this subject upon Congress.

Resolved, That the secretary of state communicate a copy of these resolutions to each of our senators and representatives in Congress.

JOHN W. STEWART,
Speaker of the House of Representatives.
A. B. GARDNER,
President of the Senate.

STATE OF VERMONT,
Office of Secretary of State.

I hereby certify that the foregoing is a true copy of joint resolutions adopted by the general assembly at its annual session, A. D. one thousand eight hundred and sixty-six, as appears from the files in this office.

In witness whereof, I hereunto subscribe my name and affix the seal of this
[SEAL.] office, at Northfield, this first day of December, A. D. one thousand eight hundred and sixty-six.

GEORGE NICHOLS,
Secretary of State.

REPORT OF THE

RESOLUTIONS

LEGISLATURE OF VERMONT

1870-71

THE VERMONT LEGISLATURE

THE VERMONT LEGISLATURE HAS THE HONOR TO ACKNOWLEDGE THE RECEIPT OF THE REPORT OF THE

COMMISSIONER OF THE LANDS AND FORESTS, AND TO RECORD THE SAME IN THE JOURNAL OF THE HOUSE, AND TO ORDER THAT THE SAME BE PRINTED AND BOUND IN A VOLUME TO BE KEPT IN THE OFFICE OF THE CLERK OF THE HOUSE.

JOHN W. STEWART,
CLERK OF THE HOUSE.

PRINTED BY J. W. STEWART, CLERK OF THE HOUSE, VERMONT, 1871.

P A P E R S

IN THE CASE OF

T H O M A S vs. A R N E L L .

DECEMBER 5, 1866.—Referred to the Committee of Elections.

DECEMBER 6, 1866.—Ordered to be printed.

To the House of Representatives of the thirty-ninth Congress :

Humbly petitioning, your petitioner, Dorsey B. Thomas, a citizen of the county of Humphreys, in the State of Tennessee, would most respectfully represent unto your honorable body that, on the first Thursday in August, 1865, an election was opened and held in pursuance of law, at the various precincts in the different counties composing the sixth congressional district of the State of Tennessee, for a member to the House of Representatives of the thirty-ninth Congress.

At the election thus opened and held in strict pursuance of the constitution and laws of the State of Tennessee, and the Constitution and laws of the United States, your petitioner received of the legal and qualified voters of said district, composed of the counties of Montgomery, Stuart, Humphreys, Dickson, Wayne, Perry, Decatur, Hardin, Lewis, Lawrence, and Maury, two thousand nine hundred and eighty-eight votes for representative to the thirty-ninth Congress, and his competitor, Hon. Samuel M. Arnell, received two thousand four hundred and ninety-six votes, which facts fully appear from certified copies of the returns of the officers who opened and held said election, and which accompany this petition, marked Exhibit A, and prayed to be taken as part thereof; and from which it will be readily seen that your petitioner received a majority of four hundred and ninety-six votes in said district, and, therefore, other things being out of the way, clearly entitled to the certificate of election from that district.

However, your petitioner states that his Excellency William G. Brownlow, governor of the State of Tennessee, whose duty it is by law to compare the returns, when thus made, in the office of the secretary of state, and grant a certificate of election to the candidate having the majority of the votes cast, in violation of the express provisions of the law in such cases made and provided, disregarded the facts as shown by the returns, and, by an arbitrary act of power unknown in the law, issued the certificate of election to the Hon. Samuel M. Arnell, who now occupies the position in your honorable body to which your petitioner was duly and legally elected.

Your petitioner refers your honorable body to the accompanying paper, marked Exhibit B, and prayed to be taken as part of this petition, being proclamation of his Excellency William G. Brownlow, dated November 25, 1865, showing his reasons for the action thus taken in violation of your petitioner's rights, and the express will of a majority of the qualified voters of said district.

Your petitioner now seeks to be restored to the rights of which he has been thus wrongfully deprived, through the action of his Excellency William G.

Brownlow, by a contest of the seat now held by the Hon. S. M. Arnell, and prays that such action will be taken by the House as is necessary for the purpose.

Your petitioner specifically alleges that the law regulating the "elective franchise" in force in the State of Tennessee, at the time said election was held, was strictly complied with by the officers holding said election; (a properly certified copy of said act, entitled "An act to limit the elective franchise," marked Exhibit C, and prayed to be taken as part of this petition, is herewith filed;) and that the subsequent action of his excellency the governor was unwarranted and illegal, and that the construction put upon the law by his excellency is not sustained by the law, and is in direct conflict with the judicial decisions of the State, as will fully appear from the opinion delivered by the Hon. William M. Smith, "judge of the common law and chancery court of Memphis," herewith filed and prayed to be taken as part of this petition, in which it will be seen that, while sustaining the "constitutionality of the law," the learned judge judicially construes the law different from the governor, and which construction your petitioner humbly submits as the correct one.

Your petitioner would now state that no written notice of his intention to contest his seat was, within thirty days after the action of the governor, deciding to whom he would give the certificate, served upon Hon. Samuel M. Arnell, because the same was by the said Samuel M. Arnell expressly waived; and it was expressly agreed by and between them that the entire matter should be submitted to this honorable body, upon petitioner stating the facts, and the only evidence to be used being "the act to limit the elective franchise, certified copies of the original returns on file in the secretary of state's office, certified copies of the correspondence held by and between his excellency the governor and the various officers holding the election," and the "proclamation of the governor," all of which various records and proclamation accompany this petition; no contest as to illegal voting or irregularity in the proceedings being made, other than such as appears from the papers now filed, and, therefore, it was not considered necessary to have written notice served—in fact, your petitioner states that written notice was expressly waived by the said Samuel N. Arnell.

The premises considered, your petitioner asks to file this his petition in regard to the contest for the seat, as member elect from the sixth congressional district of Tennessee, and that the facts in relation thereto be investigated, and such proceedings had as will do justice to your petitioner, and give to him the seat now held by the sitting member. And as in duty bound, &c.

D. B. THOMAS.

THIRTY-NINTH CONGRESS OF THE UNITED STATES,

Washington, D. C., December 4, 1866.

MY DEAR SIR: Yours of the 3d instant has been received. The following statement contains the substantial facts, so far as I remember them: In the house of representatives at Nashville, Tennessee, after learning that Governor Brownlow had given to me the certificate of election for the sixth congressional district of Tennessee to the 39th Congress, you remarked to me that you intended to contest the election. I replied, "Very well; I expect you to do so." After some other conversation of a mutually friendly character, on your turning away, I volunteered the information that it was necessary to give me notice, which you seemed not to have thought of. I further remarked that I desired to throw no obstacles in the way, and would acknowledge notice. You then called up several witnesses, and the matter was verbally understood.

Hoping that this will be satisfactory, I am, very respectfully, yours,

SAMUEL M. ARNELL.

Hon. D. B. THOMAS.

EXHIBIT A.

Sheriff's returns of an election for a member to the 39th Congress of the United States, held in the sixth congressional district of the State of Tennessee, on the 3d day of August, A. D. 1865.

STATE OF TENNESSEE, *Lawrence county* :

I, A. M. Harrison, sheriff of the county and State aforesaid, do hereby certify that at a popular election, held according to law, at all the election grounds in said county, (except two, at which a sufficient number of persons did not attend to hold an election,) on the 3d day of August, 1865, for the purpose of electing a member to Congress from the sixth congressional district of Tennessee, Samuel M. Arnell received three hundred and thirty-five votes, and D. B. Thomas one hundred and one votes.

This August 7, 1865.

A. M. HARRISON, *Sheriff*.

STATE OF TENNESSEE, *Wayne county* :

This is to certify that a popular election, held by me in Wayne county on the first Thursday, it being the 3d day of August, 1865, for a member to the Congress of the United States, the following was the result:

For S. M. Arnell.....	479 votes.
For D. B. Thomas.....	74 "
For D. Moody.....	1 "

I hereby certify that the above is a correct list of all the votes polled in said county this 7th day of August, 1865.

JOHN GRIMES, *Sheriff*.

STATE OF TENNESSEE, *Hardin county* :

I do certify that at a popular election, held, according to law, at the respective election grounds in all the civil districts in the county of Hardin and State of Tennessee, on the 3d day of August, 1865, for members of Congress, that A. M. Arnell received four hundred and eighty-eight votes, and D. B. Thomas received eighty-three votes.

This 7th day of August, 1865.

A. M. D. KEMP,
Sheriff of Hardin county.

(Decatur county the sheriff has made no returns.)

STATE OF TENNESSEE, *Perry county* :

I, John L. Webb, sheriff of said county, do certify that I caused to be opened and held an election in said county, on the first Thursday in August, 1865, for members to Congress. Arnell received one hundred and fifty-three (153) votes; Thomas received six (6) votes.

August 6, 1865.

———, *Sheriff*.

I do certify that at a popular election, held according to law, in Lewis county, on Thursday the 3d day of August, 1865, for a member to Congress, Samuel Arnell received fifty-nine votes, and Thomas received three votes.

This August 4, 1865.

M. D. BROWN,
Sheriff of Lewis county.

Seventh civil district—Arnell	7
Thomas	34
Eighth civil district—Arnell	16
Thomas	12
Ninth civil district—Arnell	19
Thomas	6
Tenth civil district—Arnell	0
Thomas	20
Eleventh civil district—Arnell	10
Thomas	8
Twelfth civil district—Arnell	26
Thomas	9

Certified and signed by—

M. G. HARRIS,
Sheriff Dickson County.

CLARKSVILLE, MONTGOMERY COUNTY, TENNESSEE,
August 8, 1865.

A. J. FLETCHER, Esq., *Secretary of State, Nashville, Tennessee:*

I certify that, at an election held on Thursday, the 3d day of August, 1865, for the purpose of electing a representative for the sixth congressional district, the full returns from each civil district in this county have been carefully examined by me, which show D. B. Thomas received 437 votes, and that S. M. Arnell received 49 votes. I have forwarded to Governor W. G. Brownlow a duplicate of this certificate, and have deposited with the county court clerk the different poll-books and a triplicate of this certificate.

BERRY LYLE,
Sheriff Montgomery County.
By Q. M. BLACKMAN,
Deputy Sheriff Montgomery County.

I certify that at a popular election, held, according to law, in the respective election grounds in all the districts in Stewart county, State of Tennessee, on the 3d of August, 1865, for member to Congress, that D. B. Thomas received seven hundred and twenty-seven (727) votes, Arnell received five (5) votes; that N. Brandon for representative for Stewart county received five hundred and ninety-nine (599) votes, that Burnett Crockrell received one hundred and nineteen (119) votes, that Jesse Glasgow received four (4) votes.

This 4th August, 1865.

W. T. KEELL, *Sheriff.*

The following is the return from the 6th Tennessee cavalry :

NASHVILLE, TENN., *July 31, 1865.*

At an election opened and held in the Exchange Barracks for the 6th Tennessee cavalry in the 4th, 6th, 7th and 8th congressional districts, also the senatorial district composed of the counties of Hardeman, McNairy and Hardin, the following vote was polled, in pursuance to the proclamation of his Excellency William G. Brownlow, dated July 29, 1865, in the manner prescribed by law.

* * * * *
here are inserted the poll-books in the return.
* * * * *

FOR CONGRESS.

Ed. Cooper.....	2
Sam. Arnell.....	64
L. R. Hawkins.....	72
R. S. Saunders	47

For senator twenty-first district, James Warren.

We, the undersigned, clerks and judges of an election opened and held in the Exchange Barracks, at Nashville, Tennessee, for the 6th Tennessee cavalry, for member of Congress and a senator in the 21st senatorial district, by virtue of a commission issued by his excellency W. G. Brownlow, governor, to W. J. Smith, colonel 6th Tennessee cavalry, do certify that the above list is a correct poll of votes at said election.

W. A. GRANT,
O. H. SHEARER,
JAMES L. M. BOATMAN, *Judges.*
S. L. WARREN,
W. A. NEWSOM, *Clerks.*

From the 7th Tennessee cavalry comes first the poll-book, and next the following :

Tally-list of votes polled at an election held at Exchange Barracks for members of Congress for the 7th congressional district of Tennessee, on the 3d of August, 1865, the voters being members of the 7th Tennessee cavalry volunteers :

Hawkins, 206 ; Etheridge, 00 ; Arnell (6th district) 2 votes.

The undersigned, judges and clerks of an election held as aforesaid, do certify that the foregoing is a correct poll-book and tally-list of said election.

E. ARBUCKLE,
BENJAMIN F. GREEN,
PLEASANT K. PARSONS, *Judges.*
J. A. TEAGUE,
JOHN W. ROWE, *Clerks.*

I, George W. Moore, captain 7th Tennessee cavalry, being in command of said regiment, hereby report that at the election held as aforesaid for members of Congress for the seventh district of Tennessee, Isaac R. Hawkins received two hundred and six votes, and that Arnell, of the sixth congressional district, received two votes.

GEORGE W. MOORE,
Captain Commanding Regiment.

The returns from the 5th Tennessee cavalry show the following result:

At an election held at headquarters 5th regiment Tennessee volunteer cavalry, in Lincoln county, Tennessee, on the 3d day of August, 1865, in compliance with orders from the governor of Tennessee, for members to the Congress of the United States, also for representatives to the State legislature, the following judges and clerks were duly qualified, viz :

Judges of election—John R. Rigsby, John B. Turner, Francis M. Cubbins.

Clerks of election—Turner L. Wood, Arthur Maguire.

The polls were duly opened at 10 o'clock a. m.; adjourning for dinner, were reopened, and closed at 4 o'clock p. m., when the following was found to be the result :

For Congress in the third district :

William B. Stokes.....	103
Asa Faulkner.....	1
Jesse Hood	0

For Congress in the fourth district :

Edward Cooper.....	1
James Mullins.....	18
W. H. Wisener.....	1

For Congress in the fifth district :

Samuel J. Carter.....	25
William B. Campbell.....	1

For Congress in the sixth district :

Samuel Arnell.....	11
James H. Thomas.....	0

For State legislature from Bedford county :

John M. Phillips.....	18
Mich. Donaway.....	0

For State legislature from Lincoln, Giles, and Marshall counties :

John F. Armstrong.....	1
Lilliard.....	1
Montgomery.....	0

We, the judges and clerks of election, held at headquarters 5th Tennessee cavalry, in Lincoln county, Tennessee, on the 3d day of August, 1865, for members to Congress and representatives to the State legislature, in conformity with instructions from the governor of Tennessee, do certify that the total number of votes polled was one hundred and sixty-three, (163.)

Of which William B. Stokes, candidate for Congress from the third district received one hundred and three (103) votes,

Asa Faulkner, candidate for Congress from the third district, received one (1) vote.

Edward Cooper, candidate for Congress from the fourth district, received one (1) vote.

James Mullins, candidate for Congress from the fourth district, received eighteen (18) votes.

Samuel J. Carter, candidate for Congress from the fifth district, received twenty-five (25) votes, and William B. Campbell, candidate for Congress from the fifth district, received one (1) vote.

Samuel Arnell, candidate for Congress from the sixth district, received eleven (11) votes.

For representative to the State legislature from Bedford county, John M. Phillips received eighteen (18) votes.

For floater from the counties of Lincoln, Giles and Marshall, to the State legislature, John F. Armstrong received one (1) vote, and — Lilliard received two (2) votes.

W. H. Wisener, candidate for Congress from the fourth congressional district, received one (1) vote.

FRANCIS M. CUBBINS,
JOHN B. TURNER,
J. R. RIGSBY,

Judges.

ARTHUR MAGUIRE,
TURNER L. WOOD,

Clerks.

	D. B. Thomas.	S. M. Arnell.	Colyar.
Lawrence	101	335	.....
Wayne	74	479	.....
Hardin	83	488	.....
Decatur.....			.....
Perry	6	153	.....
Lewis	3	59	.....
Maury	628	414	.....
Hickman.....	108	143	.....
Humphreys	377	1	.....
Dickson	247	147	1
Montgomery.....	437	49	.....
Stewart.....	727	5	.....
Fifth Tennessee cavalry		11	.....
Sixth Tennessee cavalry		64	.....
Seventh Tennessee cavalry		2	.....
Total.....	2, 805	2, 350	1

The following correspondence was elicited by the proclamation of Governor W. G. Brownlow, of August 11, 1865, calling on the sheriffs and county court clerks of the different counties of the State to say how the election was carried on and how the registration was effected. From the county of Lawrence we have the following reports :

To his Excellency the Governor of the State of Tennessee :

I, Alford M. Harrison, sheriff of Lawrence county, in obedience to your excellency's proclamation of the 11th of this instant, would most respectfully report as follows :

To first interrogatory I answer that I selected good and true men to hold the election in Lawrence county as judges of the same, and to the best of my knowledge, information, and belief, all of said judges took the oath required in the seventh section of the act to limit the franchise of the citizens of the State of Tennessee, and that they might be informed properly upon the great question of their duty, I sent to each district a copy of said bill, together with your excellency's advice to the people of the State.

To second interrogatory I answer, that, so far as I have learned, there was but one voter challenged in the county, and he was permitted to vote without taking the oath by the indorsement and recommendation of two of the judges, said voter having voted on the 22d day of February, 1864. I further state to your excellency that I am true to the State government of the State of Tennessee, and have done all I could to sustain the same in every respect.

All of which is respectfully submitted :

ALFORD M. HARRISON,
Sheriff of Lawrence County.

The clerk of the county court says :

LAWRENCEBURG, TENN., August 16, 1865.

In answer to your proclamation of the 11th of August, 1865, I, S. A. Carrell, clerk of the county court of Lawrence county, would most respectfully report as follows, to wit:

To interrogatory first I answer, that I did not issue certificates of registration to any persons without proof, under oath, that said persons fell within the pro-

visions of the first section of the franchise law, except to some fifteen or twenty persons who had been known to entertain unconditional Union sentiments from the outbreak of the rebellion, all of which, except the certificates to Mr. W. A. Garner, representative, and Mr. A. M. Harrison, sheriff, was issued before receiving your proclamation requiring *all persons* to make said proof as aforesaid.

To your second interrogatory I answer, that, as a general rule, the certificates were issued upon the oath of the applicant alone, where the proof of two persons were not required by said first section of said law, but in many cases other proof was required and made.

To your third interrogatory I answer, that where certificates were issued to persons who had been disloyal, upon the claim that they had taken the oath of allegiance, and would have voted at the previously mentioned elections, if an election had been held within their reach, they were in all cases required to make oath of that fact, and, in some instances, other proof was required, but not in many cases. I have lived in the county for the last thirty-nine years and upwards, and am acquainted with most of the persons in the county, and, in all cases where I knew the persons to be in good standing, I required nothing but their own statements, under oath, believing that in regard to the last interrogatory they knew their own intentions better than any other person or persons.

The persons registered are generally of fair reputation, and I believe that with, perhaps, a very few exceptions, clearly fall within the provisions of the first section of said law. I did not register any person that I did not consider brought himself within the provisions of the act. My deputy, Mr. W. P. H. Turner, registered but few, and if he violated my rules or instructions in any case, I have heard nothing of it. I tried to comply strictly with said law. The Union men of the county can testify as to how I discharged my duty.

Very respectfully,

S. A. CARRELL, *Clerk.*

His Excellency W. G. BROWNLOW, *Governor of Tennessee.*

P. S.—We regarded the act to limit the elective franchise as the supreme law of the land upon that subject, and endeavored to fully comply with it to the best of our ability.

S. A. CARRELL, *Clerk.*

From Wayne county there is no report by the sheriff. The county clerk reports :

WAYNESBORO, *August 29, 1865.*

SIR: Your proclamation of August 11, came to hand to-day, in which find certain questions propounded to county clerk courts. I, as clerk of Wayne county court, would respectfully submit the following answer :

To your first interrogatory I answer in the affirmative.

To the second and third I answer in the negative.

Upon receiving the act for the limitation of the elective franchise, having no legal advice, I consulted with the best informed Union citizens as to whether undoubted Union men should be required to make proof under oath, all of whom were of the opinion that such persons should not be required to make proof, and I was of the same opinion from the reading of the act, and I issued to persons whom I personally knew to be undoubted Union men certificates of registration, in accordance with that opinion—probably one-fifth of the whole number. On receiving your proclamation bearing date, I believe, July the 12th, which showed that proof under oath must be in fact made in all cases, which was on the first day of August, only two days before the election, I acted in accordance with your opinion, and, so far as I could, summoned proof under oath for those to whom I had issued certificates without such proof having been made,

so that on the day of the election there were about one-tenth of the whole number who had not been so proven, the most of whom, however, have since been proven.

All of which is respectfully submitted :

Yours, respectfully,

JOHN H. COLE, *Clerk.*

His Excellency Governor W. G. BROWNLOW,
Nashville, Tennessee.

From Hardin county there is no report by the sheriff. The clerk county court reports :

SAVANNAH, TENN., *September 11, 1865.*

SIR : In reply to the several interrogatories made in your circular addressed to the clerks of the county courts and sheriffs of this State in relation to the elective franchise, I can say that no one obtained a certificate of registration at my office without proof under oath, by two admitted voters, that the applicant came within the provisions of the first section of the law in such cases made and provided by the last legislature.

2d. No certificate of registration was issued upon the oath of the applicant alone.

3d. No certificate of registration was issued to persons who had been disloyal, but who had taken the oath of allegiance, upon their statement on oath that they would have voted in the November, February, or March elections.

Very respectfully,

BATTIS HINKLE,
Clerk of Hardin County Court.

His Excellency W. G. BROWNLOW,
Governor of the State of Tennessee.

There is no report from Decatur county.

There is no report from Perry county.

There is no report from Lewis county.

The sheriff of Maury county reports as follows :

COLUMBIA, TENN., *August 17, 1865.*

SIR : In response to your proclamation of the 11th of August, 1865, and the interrogatories therein contained, I would respectfully make answer as follows :

Answer to interrogatory first : As sheriff of Maury county, Tennessee, I held, in person, on the 3d day of August, 1865, the election at Columbia, the county seat of said county, and by my general and special deputies at the other precincts ; that prior to the day of election I procured and forwarded to each precinct in said county a copy of the oath required by the recent act of the legislature to limit the elective franchise, to be taken by the judges of the said election, and gave special instructions to the officers holding said election at the other precincts, in each and every case to administer said oath to each and all of said judges, the oath being that required by the seventh section of said act. I administered said oath to all the judges holding the election at Columbia, and from reports made to me by the officers holding the election at the other precincts in said county, and from information obtained from other persons, I believe that said oath was administered to the judges holding said election at each precinct in said county.

In answer to interrogatory second I state, that at Columbia, the precinct where I held said election, whenever a vote was challenged the judges did, or I, at their request and in their presence, did administer the said oath to each voter

whose vote was challenged; and from the best information I can obtain on the subject the same was done by the judges at the several precincts in said county. Where a man had a certificate of his qualification as a voter in due form from the clerk, and then took said oath if his vote was challenged, I believe that such certificate and such taking of the oath were by the judges regarded as conclusive of the voter's right to vote and he allowed to vote.

Having, as I believe, fully answered your interrogatories and to the best of my information and belief,

I am, dear sir, yours, most respectfully,

W. M. SULLIVAN,

Sheriff of Maury County, Tennessee.

His Excellency WILLIAM G. BROWNLOW,

Governor, &c.

The clerk county court reports :

COLUMBIA, *August 18, 1865.*

DEAR SIR: In reply to your proclamation of the 11th instant, in regard to the franchise act, I beg leave to report :

1st. That I issued but few certificates without proof under oath, and those were to men with whose antecedents I was acquainted, and who had voted against separation and representation, and who have been Union all the time; such men as the Hon. Samuel D. Frierson, Benjamin Harlan, &c. The number, I think, so issued, say 50.

2d. Independent proof was taken in regard to a great many who claimed to have publicly entertained Union sentiments as mentioned in the act, and I not being acquainted with their antecedents, witnesses were sworn in such cases, all of which witnesses were true and loyal. The number registered in this way, I think, is about 200.

3d. Certificates were issued to persons who had been disloyal (but who had taken the oath of allegiance) upon their oath that they had or would have voted in the November, February or March elections, and that it was their intention and purpose so to do but were prevented by high water, &c., or could not get to the election. I examined and questioned them closely, as required by law.

In Maury county, in February and March, 1865, when the elections were holden, a large portion of the voting population was cut off from the place where the elections are held by high water.

The number registered on the oath of the applicant alone, I think, 930. Of this number those who voted in former elections, say November, 1864, February and March, 1865, 550.

At the November election in 1864, there was polled at Columbia, 131.

At the February election, 1865, there was polled in Maury county, 654.

At the March election, 1865, there was polled in Maury, I think, 262.

The number of certificates issued is 1,180.

The number who voted 3d August, 1865, is 1,042.

The number who did not vote is 138.

Respectfully submitted :

JOHN B. PADGETT,

Clerk Maury County Court.

WILLIAM G. BROWNLOW,

Governor, &c.

The sheriff of Hickman county reports :

To his excellency W. G. Brownlow, governor of the State of Tennessee :

In obedience to your proclamation of August 11, 1865, asking my answer to the several interrogatories therein set forth :

1st. In twelve of the districts in Hickman county, all the judges of the last election were sworn in strict conformity to said seventh section of the act alluded to in said proclamation. In two districts, they being the remainder of the districts in Hickman county, the judges of the election last past were not sworn as prescribed by the seventh section of said act. The votes cast in said last-mentioned districts are as followeth: In district No. 8 there were but seven votes polled, all for Thomas; in district No. 13 there were four, all for Thomas; in the 15th district there was no election held.

Interrogatory 2d. There was but one voter challenged in the county, and he did not vote.

All of which is respectfully submitted:

JOSEPH BEASLEY,
Sheriff of Hickman County.

Clerk county court reports:

CENTREVILLE, TENN., *August 20, 1865.*

SIR: I embrace this my earliest opportunity of responding to your proclamation of August 11, it having never reached me until a day or two ago, with which I proceed to comply, to wit:

1st. I had no deputy, and hence I alone issued all the certificates that went out. I did not require loyal citizens that were publicly known to be such to make proof of loyalty. I placed no construction nor required any other than what was made my duty by the franchise bill. But, notwithstanding, there were some fifty or sixty illegal votes given in, as appears from the enclosed schedule. I ordered each voter to write his name on his ballot, and return the ballots with the poll-books from each precinct, which was done, thereby enabling me to properly ascertain the number of illegal votes given, which I hope will be satisfactory.

I am yours, truly,

M. H. PUCKETT,
Clerk of County Court Hickman County, Tenn.

His Excellency Governor W. G. BROWNLOW.

From Humphreys county we have the following reports:

WAVERLY, *August 23, 1865.*

SIR: In accordance with the requirements of your proclamation of August 11, 1865, in regard to reports of sheriffs concerning the elections held the 3d of August, 1865, for members to Congress, I, as sheriff of Humphreys county, Tennessee, make the following report, to wit:

In the following civil districts the oath required by the act of the general assembly, passed at its last session, was taken by the judges of election, and the number of votes given in each district:

Third civil district gave	62 votes.
Sixth civil district gave	111 "
Twelfth civil district gave	32 "
	205

The following is a list of the civil districts where the persons holding the elections could not get a copy of the oath required by the said act above referred to, and the oath required by the code of Tennessee was taken by the judges of said elections:

First district gave.....	32	votes.
Second district gave.....	9	"
Fourth district gave.....	49	"
Fifth district gave.....	33	"
Eighth district gave.....	31	"
Tenth district gave.....	10	"
Eleventh district gave.....	24	"
	188	

I hereby certify that the foregoing is a true statement according to the best information I can get, and that I got no information of any challenges in the county of votes. Given under my hand, at office, in Waverly, August 23, 1865.

M. M. MASSEY,
Sheriff of Humphreys County.

His Excellency W. G. BROWNLOW,
Governor of Tennessee.

The county court clerk reports :

WAVERLY, TENN., August 16, 1865.

I take the earliest opportunity to reply to the interrogatories in your proclamation of the 11th instant. In answer to the first question to county clerks, I would state that no certificate of registration was issued by me or my deputy without proof under oath that the applicant came within the provisions of the 1st section of the law referred to by you; that is to say, all that obtained certificates of registration in this county came within the provisions of the 1st section of the act to limit the elective franchise, according to my construction of the act, from all the lights I have upon the subject.

Answer to second question. With the exception of some two or three persons, all who obtained certificates got them upon the oath of the applicant alone.

In answer to your third question, I can say that a part of the certificates issued here were issued to persons who had been disloyal, but who had taken the oath of allegiance, and who stated on oath that they would have voted in the elections of November, February, and March if they had been held in their reach, and that they were true friends of the government of the United States, but what number of them had been disloyal I cannot say with certainty. I suppose that perhaps one-fourth of them had been in the rebel army, and left it some eighteen months or two years ago; and some of them, more than two years ago, returned home, sought protection under the United States government, and took the oath of allegiance and remained at home. There were others who were, during the early part of the rebellion, disloyal in feeling—or were so considered—and afterwards took the oath of allegiance, but I have no way of telling what number. All who obtained certificates I regarded as being at that time—and as having been for some time before—loyal to the United States, and friends to the government thereof, and I considered them entitled to certificates.

Yours, with due respect and esteem,

LEVI M. COLLUM,
Clerk of the County Court of Humphreys County, Tennessee.

Hon. WM. G. BROWNLOW,
Governor of Tennessee.

Dickson county reports:

CHARLOTTE, TENN., August 22, 1865.

DEAR SIR: I herein enclose the manner in which the election was held on the 3d instant in Dickson county:

District No. 1.—Judges were qualified according to section 7 of an act to limit the elective franchise; three voters were challenged, and deputy did consider taking the said oath entitled him to vote.

W. H. HORNER, *Deputy Sheriff*.

No. 2.—Judges were qualified as above. No voter challenged.

W. T. DUNIGAN, *Deputy Sheriff*.

No. 3.—Judges were qualified as district No. 1. No voter challenged.

F. M'COSLIN, *Deputy Sheriff*.

No. 4.—Judges were qualified as No. 1. No voter challenged.

J. W. SULLIVAN, *Deputy Sheriff*.

No. 5.—Judges were qualified as No. 1. No voter challenged.

N. M. HALL, *Deputy Sheriff*.

No. 6.—Judges were qualified as No. 1. No voter challenged.

M. G. HARRIS, *Sheriff*.

No. 7.—Judges were qualified as No. 1. No voter challenged.

H. N. STROUD, *Deputy Sheriff*.

No. 8.—Judges were qualified as No. 1. Two voters were challenged. Deputy sheriff did consider taking said oath entitled them to vote.

D. L. MATLOCK, *Deputy Sheriff*.

No. 9.—Judges were qualified as No. 1. No voter challenged.

J. F. BOTTS, *Deputy Sheriff*.

No. 10.—Judges were qualified as No. 1. No voter challenged.

GEO. COOKSEY, *Deputy Sheriff*.

No. 11.—Judges were qualified as No. 1. Three voters were challenged, and deputy did consider taking said oath entitled them to vote.

JESSE DANIEL, *Deputy Sheriff*.

No. 12.—Judges were qualified as No. 1. No voter challenged.

J. B. MILLS, *Deputy Sheriff*.

I have taken the trouble to go around and see all my deputies, therefore I hope this report will be satisfactory.

Very respectfully,

M. G. HARRIS.

His Excellency W. G. BROWNLOW,
Governor of Tennessee.

CHARLOTTE, *August 22, 1865.*

DEAR SIR: In compliance with the proclamation of his excellency Governor W. G. Brownlow, of August 11, 1865, I herewith submit to you my report:

To interrogatory first, I issued no certificates without proof, under oath, that the applicant came within the provisions of the 1st section of the franchise act.

2d. Did you or your deputy issue certificates upon the oath of the applicant alone? I suppose we issued about fifty or sixty upon the oaths of the applicants alone, and all others issued by me or my deputy were upon proof made under oath by a witness introduced by the applicant, except those who were known to me as unconditional Union men.

Very respectfully,

F. M. BINKLEY,
Clerk of Dickson County Court.

Hon. A. J. FLETCHER,
Secretary of State.

CLARKSVILLE, TENN., *August 19, 1865.*

To O. M. Blackman, Deputy Sheriff, M. C.:

Question. Did you hold the election in the Clarksville district on the 3d day of August, 1865, under the franchise act of 1865?

Answer. I did.

Question. Did the judges of that election, before entering upon the duties of their office, take the oath required by the 7th section of said act?

Answer. They did.

Question. Did the judges of said election, when a vote was challenged, administer the oath prescribed by said 7th section?

Answer. In every case, I think, they did not. Not more than four or five votes were challenged, though all voters were questioned in regard to their right to vote; some of them under oath to answer such questions as should be asked them touching their right to vote at that election. If answering the questions satisfactorily to the judges and producing the required certificates, their vote was deposited in the box.

O. M. BLACKMAN,
Deputy Sheriff, M. C.

170 votes were polled at this precinct, Clarksville.

To John Brumfield, District No. 2, Montgomery County, Tennessee:

Question. Did you hold the election in your district on the 3d day of August, 1865, under the franchise act of 1865?

Answer. I did.

Question. Did the judges of that election, before entering upon the duties of their office, take the oath required by the 7th section of said act?

Answer. They did not. They took the oath prescribed by the code.

Question. Did the judges of said election, when a vote was challenged, administer the oath prescribed by said 7th section?

Answer. There were no votes challenged. Only five votes were taken at my precinct.

J. D. BRUMFIELD.

AUGUST 26, 1865.

To V. Q. Jarrill:

Question. Did you hold the election in your district (No. 14) on the 3d day of August, 1865?

Answer. I did.

Question. Was the oath prescribed by the 7th section of the act to limit the elective franchise taken by the judges before entering upon their duties?

Answer. It was not.

Question. How many votes were polled at your district?

Answer. Twenty-three votes, and no votes were challenged at my district. No man voted without first showing his certificate.

This August 26th, 1865.

V. Q. JARRILL.

CLARKSVILLE, August 17, 1865.

To T. T. Harper, District No. 16, Montgomery County, Tennessee:

Question. Did you hold the election in your district on the 3d of August, 1865, under the franchise act of 1865?

Answer. I did.

Question. Did the judges of that election take the oath required by the 7th section of said act?

Answer. They did.

Question. Did the judges of said election, when a vote was challenged, administer said oath?

Answer. No votes were challenged at my precinct. Twelve votes were taken; all had the clerk's certificate, and I believe they were all legal voters under the franchise act.

T. T. HARPER.

CLARKSVILLE, August 17, 1865.

To T. G. Hargrove, District No. 17, Montgomery County, Tennessee:

Question. Did you hold the election in your district on the 3d of August, 1865, under the franchise act of 1865.

Answer. I did.

Question. Did the judges of that election, before entering upon the duties of their offices, take the oath required by the 7th section of said act?

Answer. They did not. No copy of the act was to be had, and they took the oath prescribed in the code.

Question. Did the judges of said election, when a vote was challenged, administer the oath prescribed by said 7th section?

Answer. They did not. Only one vote was challenged, and that was on account of the voter having no certificate. He proved that he had obtained the proper certificate, but had either mislaid or lost the same. The judges allowed him to vote. Thirty-four votes were taken at my precinct, all of which had the clerk's certificate except the one before mentioned; and no other votes were challenged.

T. G. HARGROVE.

Clerk reports:

CLARKSVILLE, TENN., August 19, 1865.

DEAR SIR: In reply to your interrogatories in your proclamation of the 11th instant, in reply to your first question, I will state the number of certificates issued by me, as near as I can, (without administering an oath under section 1 of the franchise act,) to be about 130. This number embraces those who had voted in the presidential election in November, 1864, and those who voted in the February and March elections, 1865, and also those of undoubted loyalty. In answer to your second question—issued certificates to about 500 persons on their oath alone. In answer to your third question—the number of certificates issued to persons who had been disloyal, but who had taken the oath of alle-

giance to the United States before the 4th of March, upon their oath or exhibiting the oath of allegiance, and would have voted if the election had been held within their reach, all of the number and persons embraced in my second answer, say about 500. I did not keep my register in a way that I might have done in order to detect any error in the certificates issued, as I did not issue a certificate unless I thought the applicant was entitled to vote under the 1st article of the franchise act. I may have committed some errors in my issuing certificates; if so, it was unintentional, as my constant aim in all cases was to do my duty as an officer of the county and State. I am complained of by many of my personal friends for not giving them certificates. If reference is necessary, I can only refer you to the whole community of our town and county.

Respectfully, your obedient servant,

W. E. NEWELL,
Clerk C. C. M. C.

W. G. BROWNLOW,
Governor of the State of Tennessee, Nashville.

From Stewart county the following reports :

DOVER, TENNESSEE, *October 5, 1865.*

DEAR SIR : In response to your interrogatories in regard to the election recently held, I have again briefly to state that all the judges of elections in my county were duly appointed according to law; that the oath required of them in his excellency Governor Brownlow's proclamation was duly administered to them all; and that no one voted at said election without a certificate as required by the franchise bill; and that the oath prescribed by said bill was duly administered to every one whose right to vote was challenged.

I am, very respectfully, yours,

W. T. KEEL,
Sheriff of Stewart County.

Hon. A. J. FLETCHER,
Secretary of State, &c.

Clerk reports :

DOVER, TENNESSEE, *October 10, 1865.*

DEAR SIR : In accordance with the proclamation of Governor W. G. Brownlow, I, some time since, made a statement upon the subjects therein embraced, which I have been informed within the last two days never came to hand. I will now proceed to respond a second time, by saying, in the first place, that I endeavored to understand and to perform my duty in the issuing of certificates to voters in the utmost good faith, and in strict obedience to the law as I understood it. In response to your first interrogatory, I reply that no certificates were issued without proof under oath that the applicants came within the provisions of the first section of the act, unless it was in a very few instances, to men of undoubted Union sentiments.

In response to your second interrogatory, I reply that I suppose that about one-third of the applicants obtained certificates upon their own oaths, but, in nearly every instance, upon their producing certificates of having taken the oath of allegiance or amnesty oath, and upon my being satisfied from my knowledge of the character of the applicants, and from other circumstances, that they had kept the oath in good faith and demeaned themselves as loyal citizens.

In reply to your third interrogatory, I reply that very few, not exceeding twenty-five, obtained certificates upon their statement on oath that they would have voted in the elections referred to, and those were kept from coming to the election by backwater, guerillas, and other insurmountable obstacles.

All the residue of the persons who obtained certificates did so upon proving satisfactorily to me by the oaths of other persons, accompanied with certificates, that they had taken the oath of amnesty or of allegiance, and had conducted themselves as good, peaceable, and loyal citizens ever since said oaths were taken, or that they had voted in some one of the elections required by the act as a qualification to obtain certificates. No certificate was given to a single rebel soldier who continued in the rebel service until the expiration of the war. Nearly all the successful applicants claimed to have been loyal citizens, and proved themselves to have so conducted themselves to my satisfaction by the testimony of credible witnesses.

I have the honor to present assurances of my highest consideration and regard.

Yours truly,

W. COOK,

Clerk of County Court of Stewart County.

Hon. A. J. FLETCHER,

Secretary of the State of Tennessee.

I, Andrew J. Fletcher, secretary of state of the State of Tennessee, do hereby certify that the foregoing is a true copy of the returns of an election for member to the Congress of the United States from the sixth congressional district of said State, furnished by the sheriffs of the several counties of that district, and the judges of election in the fifth, sixth, and seventh regiments of Tennessee cavalry, and of the reports elicited by the proclamation of Governor W. G. Brownlow, bearing date August 11, 1865, from the various sheriffs and county court clerks of said congressional district, as far as ever returned to me. I also certify that the accompanying slips of printed matter are true copies of the proclamations of the date they bear, and of the franchise law of June 5, 1865. I also certify that there is omitted the list of names in the poll-books of Dickson county, and of the three regiments named, and a list furnished by the clerk of Hickman county. The certified result in each case is given. The original papers are on file in this office.

In testimony whereof, I have hereunto subscribed my official signature, and, by order of the governor, affixed the great seal of the State of Tennessee, at the department, in the city of Nashville, this 27th day of November, 1865.

[SEAL.]

A. J. FLETCHER,

Secretary of State.

EXHIBIT B.

Message from the Governor—The August election.

The following message from Governor Brownlow was transmitted to and read in the house yesterday :

EXECUTIVE DEPARTMENT, NASHVILLE, TENNESSEE,

November 25, 1865.

GENTLEMEN OF THE GENERAL ASSEMBLY: In compliance with your joint resolution, adopted November 23, 1865, I have the honor to make the following report :

On the 10th of July last, seeing a general disposition to disregard the "act to limit the elective franchise," I issued my proclamation, requiring a strict execution of the law, and announcing "that all the votes of all persons and counties contrary to the strict provisions of this law be thrown out and not taken into account."

After the election, being assured that the law had "been in some counties erroneously construed, and in others wilfully evaded, and in some instances totally disregarded," I issued my proclamation, calling upon the clerks and sheriffs and loyal citizens for information as to the manner in which voters had been registered and the election held. Copies of these proclamations are herewith presented.

Most of the clerks and sheriffs of the various counties of the State have responded to the inquiries made in the proclamation of August 11, and I regret to find that I was not mistaken in my apprehensions that the law had been extensively misconstrued and disregarded.

Certificates of registration seem to have been obtained generally in five different modes:

1. Where the applicant was known to the clerk to be of publicly known Union sentiments.
2. Upon proof by witnesses that the applicant came within the provisions of the "act to limit the elective franchise."
3. Upon the oath of the applicant alone, that he came within some provision of the law.
4. The production of an oath of allegiance or amnesty, taken at some time by the applicant.
5. Where the applicant was certified or vouched for by some official, either civil or military.

With some doubts as to the legality of issuing certificates to persons of publicly known Union sentiments without proof, the clerk being the judge, I have, nevertheless, admitted that method of registration where there was no evidence of abuse of the discretion assumed by the clerk.

The second method enumerated is clearly legal, but the last three are clearly illegal.

Believing that an applicant for registration must either be known to have been a man of publicly known Union sentiments, at all times, or must produce proof under oath that he comes within the provisions of the law, I have, in the application of this construction, "thrown out and not taken into account" the votes cast in the following counties, as illegally registered, viz: Hawkins, McMinn, Monroe, Meigs, Grundy, Van Buren, White, Smith, Putnam, Jackson, Macon, Coffee, Franklin, Marshall, Benton, Williamson, Davidson, Sumner, Robertson, Cheatham, Maury, Humphreys, Montgomery, Stewart, Lawrence, Gibson, Weakly, Madison, and Lauderdale.

The vote of the following counties, having been registered in the one or the other of the two modes first enumerated, have been taken into account, viz:

Johnson, Carter, Green, Cocke, Jefferson, Sevier, Granger, Union, Knox, Campbell, Anderson, Morgan, Blount, Bradley, Hamilton, Polk, Marion, Bledsoe, Meigs, Warren, Smith, Putnam, DeKalb, Rutherford, Lincoln, Giles, Cannon, Coffee, Franklin, Wilson, Hickman, Wayne, McNairy, Hardeman, Shelby, and Haywood.

From the following counties I have no satisfactory reports, the presumption being in favor of the legality of the registration, viz: Sullivan, Washington, Hancock, Scott, Polk, Roane, Sequatchie, Cumberland, Fentress, Rhea, Overton, Bedford, Perry, Lewis, Decatur, Henderson, Fayette, and Tipton.

The following table shows the vote of each district as shown by the original returns, and also as modified by omitting counties improperly registered:

FIRST DISTRICT.

	Total.	Cast out.	Corrected.
N. G. Taylor	5, 236	180	5, 056
J. K. Miller	4, 400	740	3, 720
J. H. Randolph	1, 626	32	1, 594
T. D. Arnold	26	4	22

SECOND DISTRICT.

H. Maynard	7, 156	1, 557	5, 599
J. A. Cooper	2, 323	212	2, 081
L. C. Houk	1, 859	209	1, 650

	Total.	Cast out.	Corrected.
R. K. Byrd	1, 210	376	834
F. S. Heiskell.....	217	54	160
B. Wells	21	14	7

THIRD DISTRICT.

W. B. Stokes	4, 454	1, 855	2, 599
A. Faulkner	2, 549	1, 525	1, 024
J. R. Hood	845	664	181

FOURTH DISTRICT.

Edmund Cooper	7, 684	2, 366	5, 318
James Mullins.....	224	16	208
Featherstone	1	1	..
Wisner.....	9	..	9

FIFTH DISTRICT.

W. B. Campbell	6, 354	5, 043	1, 311
S. J. Carter	1, 729	1, 524	205
W. R. McDougal	11	4	7
W. L. Waters	2	..	2
J. H. Smith	2	..	2

SIXTH DISTRICT.

D. B. Thomas.....	2, 805	2, 284	521
S. M. Arnell	2, 350	804	1, 546
Collier	1	..	1

SEVENTH DISTRICT.

I. R. Hawkins	3, 322	1, 254	1, 068
E. Etheridge.....	1, 819	1, 115	704
Scattering	5	1	4

EIGHTH DISTRICT.

R. S. Saunders.....	588	63	525
J. W. Leftwich	1, 673	305	1, 368
William Hunter	100	3	97
John Bullock	600	3	597
William C. Dunlap	525	32	493

With regard to the election of members of the legislature to fill the vacancies, you are the exclusive judges. But with regard to the election of officers to be commissioned by the executive, I have a duty to perform, and must know that a valid election has been held.

If there had been no other law to be regarded in the issuance of commissions or certificates to the members of Congress but the code, (section 735,) my duty would have been quite plain. But the "act to limit the elective franchise" has been since passed. It proposes a great change—I may say revolution—in our elective system. It announces that a large portion of our people have made war upon the government, and are unsafe depositaries of the elective franchise. It provides, moreover, for a registration of voters, and declares that no one is a legal voter unless he shall have a certificate of registration, and that certificate must be obtained in a legal way. A valid registration becomes indispensable to a valid election.

Again, by an act of Congress approved March 3, 1865, before the Clerk of the House of Representatives can enrol a member his certificate must show that he was "regularly elected according to the laws of the State or of the United States."

With official information before me that the votes cast for a candidate are illegal and his election void, I cannot, and will not, certify that he is "regularly elected according to the laws of the State." Whatever others may think of my duty, I will not declare, in a certificate or otherwise, that the election was regular in counties and districts where I officially know that it was not regular.

It will be seen that the law was more extensively disregarded in the middle than in either of the other divisions of the State. In the face of my proclamations and address, in spite of the telegraphic instructions of the President and the presence of the military, but one single county in the Nashville district held an election according to law, and that only in part. In the county of Wilson there were 1,026 legal and 593 illegal votes cast. Governor Campbell received his certificate on the vote of Wilson alone, having received all the votes cast in that county but 180, every other county in his district being thrown out. It is no doubt true that of 6,354 votes received by Governor Campbell, many, perhaps a majority, were cast by citizens who were entitled to vote if legally registered.

In the sixth congressional district I am compelled to throw out the votes of the counties of Maury, Humphreys, Montgomery, Lawrence, and Stewart, the registration being clearly void according to the reports of the clerks in answer to the proclamation of August 11. This produces a different result than that produced by the sheriff's returns of the whole vote. The vote of the counties of Dickson, Hickman, and Wayne, which appear to be correctly registered, elects Mr. Arnell by a majority of 791 votes. The votes of the counties of Perry, Lewis, and Decatur, whose clerks have not responded to the proclamation, will increase this majority to near 1,000. Counting the entire vote of the district, without regard to the mode of registration, Mr. Thomas received 2,805 votes, and Mr. Arnell 2,352.

My construction of the law which regulates my duties compels me to issue a certificate to Mr. Arnell; but I am relieved of much responsibility by the fact that my decision is not conclusive, and that the question is still open for the action of Congress.

In the other congressional districts majorities are reduced or increased by the action I have taken; but the result is in no case changed.

The entire vote of the State is 61,783. Omitting the vote illegally registered, it is reduced to 60,509. But I must repeat that there can be no doubt but a large portion of the voters in the counties I have been constrained to reject were justly entitled to certificates if the law had been complied with. I sincerely regret that loyal men should be deprived of their votes by the fault or mistake of others. The remedy lies in a new registration, which, I hope, will be at once ordered, for, having acted in this matter with deliberation and from a sense of right, I shall be compelled hereafter to disregard elections held in the counties indicated in this report as illegally registered.

The official reports of the clerks and sheriffs in response to the proclamation of August 11, as well as the original returns, are on file in the office of the secretary of state, subject to the examination of all concerned.

Respectfully submitted :

W. G. BROWNLOW.

EXHIBIT C.

AN ACT to limit the elective franchise.

Whereas the first article and the first section of the declaration of rights in the constitution of the State of Tennessee declares "That all power is inherent in the people; and all free governments are founded on their authority and

instituted for their peace, safety, and happiness; for the advancement of these ends they have at all times an inalienable and indefeasible right to alter, reform or abolish the government in such manner as they may think proper;" and whereas a large and respectable convention of the free and loyal people of the State of Tennessee met in the city of Nashville, on the 9th day of January, 1865, and proposed certain alterations and amendments to the constitution of the State of Tennessee, for rejection or ratification by the loyal people on the 22d of February following; and whereas said amendment and schedule were solemnly ratified with great unanimity by the authoritative voice of the people; and whereas the 8th section of said schedule provided for the election of a governor and members of the legislature on the 4th day of March, 1865, and who, in accordance therewith, were elected by the ballots of the loyal people; and whereas the same authoritative voice in section 9 of the schedule delegated to the general assembly meeting first under this amended constitution the right to fix the qualification of voters and the limitation of the elective franchise: Therefore, acting faithfully under and in accordance with this delegation of supreme power—

SECTION 1. *Be it enacted by the general assembly of the State of Tennessee,* That the following persons, to wit: first, every white man twenty-one years of age, a citizen of the United States, and a citizen of the county wherein he may offer his vote six months next preceding the day of election, and publicly known to have entertained unconditional Union sentiments from the outbreak of the rebellion until the present time; and second, every white man, a citizen of the United States, and a citizen of the county wherein he may offer his vote six months next preceding the day of election, having arrived at the age of twenty-one years, since March 4, 1865, provided that he has not been engaged in armed rebellion against the authority of the United States, voluntarily; and third, every white man of lawful age coming from another State, and being a citizen of the United States, on proof of loyalty to the United States, and being a citizen of the county wherein he may offer his vote six months next preceding the day of election; and fourth, every white man, a citizen of the United States and a citizen of this State, who has served as a soldier in the army of the United States, and has been or may be hereafter honorably discharged therefrom; and fifth, every white man, of lawful age, a citizen of the United States, and a citizen of the county wherein he may offer his vote six months next preceding the day of election, who was conscripted by force into the so-called confederate army, and was known to be a Union man, on proof of loyalty to the United States, established by the testimony of two voters, under the previous clauses of this section; and sixth, every white man who voted in this State at the presidential election in November, 1864, or voted on the 22d of February, 1865, or voted on the 4th of March, 1865, in this State, and all others who had taken the oath of allegiance to the United States, and may be known by the judges of elections to have been true friends to the government of the United States, and would have voted in said previously mentioned elections, if the same had been holden within their reach, shall be entitled to the privilege of the elective franchise.

SEC. 2. *Be it further enacted,* That all persons who are or shall have been civil or diplomatic officers or agents of the so-called Confederate States of America, or who have left judicial stations under the United States or the State of Tennessee to aid in any way in the existing or recent rebellion against the authority of the United States, or who are or shall have been military or naval officers of the so-called Confederate States above the rank of captain in the army or lieutenant in the navy, or who have left seats in the United States Congress or seats in the legislature of the State of Tennessee to aid said rebellion, or have resigned commissions in the army or navy of the United States and afterwards have voluntarily given aid to said rebellion, or persons who have engaged in any way in treating otherwise than lawfully as prisoners of war

persons found in the United States service as officers, soldiers, seamen, or in other capacities, or persons who have been or are absentees from the United States for the purpose of aiding the rebellion, or persons who held pretended offices under the government of States in insurrection against the United States, or persons who left their homes within the jurisdiction and protection of the United States, or fled before the approach of the national forces and passed beyond the federal military lines into the so-called Confederate States for the purpose of aiding the rebellion, shall be denied and refused the privilege of the elective franchise in this State for the term of fifteen years from and after the passage of this act.

SEC. 3. *Be it further enacted*, That all other persons except those mentioned in section 1 of this act are hereby and henceforth excluded and denied the exercise of the privilege of the elective franchise in this State for the term of five years from and after the passage of this act.

SEC. 4. *Be it further enacted*, That all persons embraced in section 3 of this act, after the expiration of the said five years, may be readmitted to the privilege of the elective franchise by petition to the circuit or chancery court, on proof of loyalty to the United States, in open court, upon the testimony of two or more loyal citizens of the United States.

SEC. 5. *Be it further enacted*, That so long as any of the white citizens of the State of Tennessee who by this act are entitled to exercise the elective franchise shall be connected with the army of the United States, or with the militia force of this State in actual service, the governor shall issue writs of election to the commanding officer of such brigades, regiments, or detachments of Tennessee soldiers, wherever located, who shall open and hold the election and receive the votes of their respective commands, and return the same to the secretary of state, and which shall be counted in the same way and manner as if said votes had been cast in any of the counties of the State to which the soldiers belonged.

SEC. 6. *Be it further enacted*, That it shall be the duty of the county court clerk in each county to open and keep a registration of voters, and before whom proof, under oath, that the voter falls within the provisions of article 1 of this act shall be made: *Provided*, No man of publicly known Union sentiments shall be required to make oath in doing the same; and said clerk shall receive such compensation as the county court in each county may deem proper; and also said clerk shall issue to all said persons a certificate of registration, and no one shall be permitted by the judges of election to vote unless so registered.

SEC. 7. *And be it further enacted*, That any voter may be challenged by an admitted voter of section 1 of this act on offering his vote, and thereupon the judges of elections shall peremptorily administer to the person so challenged, before permitting him to vote, the following oath, said oath also to be taken by all judges of elections and candidates for office:

"I solemnly swear that I will henceforth support the Constitution of the United States, and defend it against the assaults of all its enemies; that I am an active friend of the government of the United States; that I will heartily aid and assist the loyal people in whatever measures may be adopted under the Constitution of the United States, and under all laws and proclamations made in pursuance thereof, to establish the national authority over all the people of every State and Territory embraced in the national Union; and that I will faithfully and most heartily support and defend the constitution of the State of Tennessee and the amendments and schedule thereunto appended and adopted by the people on the 22d day of February, 1865, and also all acts of the general assembly assembled in accordance therewith; and that I take this oath freely, voluntarily, and without mental reservation. So help me God."

SEC. 8. *And be it further enacted*, That any person taking this oath falsely

shall be guilty of perjury, and shall suffer all the pains and penalties attached to that crime.

SEC. 9. *And be it further enacted*, That the power is reserved to alter, amend, or change the provisions of this act at any time when in the opinion of this general assembly of the State it is right and proper so to do.

SEC. 10. *Be it further enacted*, That this act shall take effect from and after its passage.

Passed June 5, 1865.

WILLIAM HEISKELL,

Speaker of the House of Representatives.

S R. RODGERS,

Speaker of the Senate.

EXHIBIT D.

Important decision under the disfranchisement law.

John F. Sale, esq., of Memphis, applied to the clerk of the county court of Shelby county to have his name registered and a certificate given him under the provisions of the disfranchisement act. The clerk refused to comply with the request, on the ground that Sale would not undertake to prove that he had been "publicly known to have entertained loyal sentiments from the outbreak of the rebellion in 1861." Thereupon Sale petitioned Judge Smith, of the common law and chancery court of Memphis, for a *mandamus* to compel the clerk to issue the certificate of registration. Judge Smith granted the writ, and on the 29th ultimo rendered his decision in the case, which is printed in the Memphis Bulletin as follows:

The relator alleges in his petition that he is entitled to a certificate of registration as a voter of Shelby county; that he has applied to defendant, the clerk of the county court of said county, for the same, and has been refused; and he prays for a *mandamus* to compel defendant to issue to him said certificate.

Upon this petition, a *mandamus nisi* was ordered and issued, and the defendant appeared and moved to dismiss the petition. This motion admits the facts stated in the petition, and raises a question of law to be determined, viz: "Is the relator, from his own showing of facts, entitled to vote under the constitution and laws of the State of Tennessee?"

The petition admits that so much of the act of June 5, 1865, as requires a registration of voters is valid, and therefore it was necessary for the relator to apply for a certificate of registration. But it denies the validity of the restrictive provisions of said act, and brings their constitutionality directly in question. And the determination of this question makes it necessary to inquire whether the recent amendments to the constitution are a part of the supreme law of the State.

Then are the amendments adopted by the convention, assembled in Nashville in January last, and submitted to a vote of the people on the 22d of February last, a part of the constitution of the State of Tennessee?

The decision of this question belongs to the political and not to the judicial power. This doctrine has been established by the Supreme Court of the United States in the case of *Luther vs. Borden*, 7 Howard's R., p. 1, (known as the Dorr rebellion case,) and also by the supreme court of Rhode Island on the trial of Dorr. The principle is, that whatever the political power declares to be the paramount law of the State, the judicial power is bound to recognize as such.

Chief Justice Taney, in delivering the opinion of the Supreme Court in the case referred to, at page 47 of the report, says: "No one, we believe, has ever doubted the proposition that, according to the institutions of this country, the

sovereignty in every State resides in the people of the State, and that they may alter and change their form of government at their own pleasure. But whether they have changed it or not, by abolishing an old government and establishing a new one in its place, is a question to be settled by the political power. And when that power has decided, the courts are bound to take notice of its decision and follow it."

Accordingly it was held that as the political power of Rhode Island had determined that the old charter government, and not the Dorr constitution, was the paramount law of the land, the courts were bound to regard it as such.

Then have these amendments been declared by the political power of the State to be a part of the constitution of the State of Tennessee? The political power of the State, on the 22d of February last, and until about the first of April, was vested in Andrew Johnson, who had been appointed by the President of the United States military governor of the State. There was no other State government loyal to the United States—no other not in open rebellion against the authority of the United States. That the President had the authority to establish a civil government, and appoint a governor, when the United States forces took possession of the State and expelled the rebel government, will hardly now be questioned. See *Cross vs. Harrison*, 16 Howard's S. C. R., 189; *Leitensdorfer vs. Webb*, 20 Howard, 176. The political power of the State, then, being in Andrew Johnson, on the 25th day of February, 1865, he issued his proclamation, in which is contained the following declaration:

"Therefore, I, Andrew Johnson, military and acting governor of the State, by virtue of the power and authority in me vested, do hereby declare that the foregoing alterations and amendments to the constitution of the State of Tennessee, and the schedule thereto annexed, have been ratified and confirmed by vote of the people of the State, and that said articles now constitute a part of the permanent constitution and supreme law of the State of Tennessee, and, as such, are hereafter to be so held and regarded by all the people thereof."

After this proclamation an election was held on the 4th of March, 1865, as provided for in said schedule, for governor and members of the legislature, who were accordingly elected and installed, and became the political power under said amended constitution. It may be further stated that the President of the United States has recently, by public proclamation, fully recognized the present State government, acting under the amended constitution, as the political power of the State of Tennessee, and declared the State no longer in rebellion. This question, therefore, is forever settled and at rest; and the amendments adopted on the 22d of February, 1865, must henceforth be regarded by the courts, and obeyed by the people, as a part of the supreme law of the State.

But it is insisted by the counsel for the relator that as section 9 of this schedule does not expressly abrogate section 1 of act 4 of the old constitution, said section must be regarded as still in force; and, consequently, the legislature first assembled under the new constitution could pass no act conflicting with said section. If this position be correct, then the convention meant nothing at all by section 9 of the schedule, and it must be regarded as a mere blank.

By said section 1 of act 4 of the old constitution, every free white man, of the age of twenty-one years, a citizen of the United States, and a citizen of the county in which he offers his vote six months, &c., was entitled to vote. This was the supreme law of the land when the convention assembled and enacted, in section 9 of the schedule, that the qualifications of voters and the limitation of the elective franchise may be determined by the general assembly which shall first assemble under the amended constitution.

The mere policy of these sections of the old amended constitution in juxtaposition seems a sufficient answer to the argument. The old and new law being in conflict, the latter must stand. (1 Blackstone's Com., 89.) The old law was

article 4, section 1, of the old constitution—the mischief was the unlimited right of voting, and the remedy is the restriction of this right. “And it is the business of the judge so to construe the law as to suppress the mischief and advance the remedy.” (1 Blackstone, 87.) Section 9 of the schedule must be so construed as to give some meaning. If it means anything, it certainly confers on the legislature first to assemble the power to impose qualifications, limitations, and restrictions on the privilege of voting, which are not imposed by the old constitution.

I must hold, therefore, that the legislature had the power to impose limitations and restrictions on the elective franchise, which have not existed heretofore. And this holding also disposes of the objections made in the petition to section 2 and 3 of the act of June 5, 1865.

But it was urged in the argument that this act is in conflict with the Constitution of the United States and the Tennessee bill of rights.

First. That it is in conflict both with section 11 of the bill of rights of this State, and with section 10 of article 1 of the Constitution of the United States, because it is in the nature of an *ex post facto* law, and imposes penalties and punishments on crimes committed before its passage.

The answer to this objection is, that this act inflicts no penalties. It enacts no new punishments for treason, or any other crime. It does not propose to punish criminals; but only deprives some of the citizens of the State of a privilege. It is no penalty or punishment, in the legal meaning of the words, to prevent a man from voting. If it is, then every minor is undergoing punishment until he arrives at age. Every citizen who removes from Fayette to Shelby county is punished six months for his removal, and every foreigner arriving in the United States is subjected to penalties and punishments for five years. The elective franchise is not even a vested right, but is a mere naked privilege, which the supreme law may restrict at pleasure.

Secondly. It is insisted that this act is in violation of the eighth section of the bill of rights, which declares, among other things, “that no freeman shall be disseized of his liberties or privileges but by the judgment of his peers or the law of the land.” The argument is, that voting is a privilege of which a man cannot be deprived except by the judgment of his peers or the law of the land. This is certainly correct. But is not this act the “law of the land?” It is a general law, applicable to all the citizens of the State. (See 1 Meigs’ Dig., p. 315; 2 Yerg., 260; Constitution, art. 11, sec. 7.) A law providing that A shall not vote is void. It is not the “law of the land.” But a general law, applicable to all the citizens of the State, is the “law of the land,” by which a man may be deprived of his privilege of voting.

Thirdly. It is argued that the act is in conflict with section 5 of the bill of rights, which declares that “elections shall be free and equal.”

It is assumed that, under this section, if any free white man, over the age of twenty-one years, &c., is excluded from the privilege of voting, an election cannot be “free and equal.” But is this the meaning of the section? I think not. The meaning is that every legally qualified voter must have a free and equal chance with all others of voting. Hence any enactment providing that one class of voters shall have the preference in approaching the ballot-box, or that voters shall vote in a particular way, or presenting a test for one legally qualified voter which is not imposed on others, or any other law of a like nature, would be unconstitutional and void. So also certain proceedings of those controlling or assuming to control an election, such as sending armed forces to intimidate voters, placing men around the polls to take down the names of those who vote in a certain way, directing that the ballots of all those voting in a particular way shall be of a certain form, size, or color, and that those who do not offer ballots of that particular description shall be “marked”—these and like proceedings prevent an election from being free and equal, and an election so held is void.

But it is particularly urged in this connection that the law conflicts with the 5th section of the bill of rights, because it is provided by the proviso of the 6th section of the act "that no man of publicly known Union sentiments shall be required to make oath when he applies for the certificate," while others may be so required. It will be observed that by said section no person is a voter until he obtains a certificate. After obtaining certificates all are on an equal footing and subjected to the same tests, if challenged, by section 7 of the act. All having certificates are voters, and have a free and equal chance of depositing their ballots.

On examining the act, however, it will be seen that no test oath is required of any applicants for registration. Before issuing a certificate the clerk must be satisfied by proof, under oath, that the applicant is a legal voter. This should ordinarily be shown by the oaths of third persons, but may, I suppose, in the discretion of the clerk, be shown by the oath of the applicant himself. But no particular oath is prescribed as a *test* for any applicant. The clerk is only directed not to require the oath of a publicly known Union man. It would be entirely unnecessary to do so, after the fact that he has been publicly known as a Union man has been established, as it should be, by the evidence of third persons. But even if this proviso were void, it would not invalidate the remainder of the act, or the remainder of the 6th section.

Fourthly. It is urged in the petition, though not in the argument, that the legislature could not confer on the county court clerk the power to determine the qualifications of voters, because that would be conferring judicial powers on said officer, which would be in conflict with article 2, section 2, of the constitution. As this position has not been taken in the argument, it is only necessary to say that it is not tenable. The county clerk is neither a judicial, legislative, nor executive officer, in the meaning of that article of the constitution. He is a ministerial officer. Neither is the determining of the qualifications of voters a judicial function; nor are judges of elections a part of the judicial department of the government.

But it was urged in the argument that it is inexpedient to vest this power in the clerk, because he might illegally use it in depriving a man of the privilege, and leave him without remedy or redress. It is true, a clerk might illegally refuse an applicant; so might the judges of election, or any other officer or body in whom this power might be vested. But would the applicant be without remedy? Certainly not. Has not the relator in this case a remedy, which he is now vigorously pursuing? Nor is the mandamus the only remedy. A suit for damages may be brought against the clerk for an illegal refusal to issue a certificate.

I have thus alluded, at some length, to all the objections to this, none of which appear to me to be well taken, and I therefore hold that the act is a valid and constitutional law, and that it must be obeyed.

It is said that the government should be liberal. So say I; and I think it is liberal. Many who, but a few months since, were in open rebellion, are now permitted to engage in all the ordinary pursuits of life without let or hindrance. Whether the State should have gone further, and permitted them to exercise all the privileges of citizenship, is a question not for the courts to determine. That belongs to another department.

But, if the policy of the law is correct, surely no one can charge that its provisions are illiberal. I cannot see how any one whose sentiments have been loyal to the government, and who has, even lately, been willing to manifest those sentiments by his action, can be excluded from voting under this act. The first five clauses of the first section of the act are broad enough to include large numbers of voters. But the legislature did not stop there. It provided that all citizens of Tennessee who were willing to acknowledge and obey the authority of the government, by voting in this State for President in November last, may

vote regardless of what had been their former opinions. Surely all loyal men, in that great crisis of the government, would have voted had an opportunity been afforded, particularly as the continued existence of Tennessee as a State had been acknowledged, by placing on the presidential ticket a citizen of the State.

But this is not all. Two other elections were held in February and March, 1865, intended to inaugurate the very State government which now controls the State. A voter at either of these elections is now a qualified voter under this act, regardless of former opinions. How could loyal men then stand silent by, and refuse to aid in the restoration of civil government? And if they did, can they now complain that the new government doubts the sincerity of their present avowals of loyalty. Can they complain that it is doubted whether such loyalty could stand the test of adversity?

But the legislature went one step further, and provided that any person "who had taken the oath of allegiance to the United States government, and who shall satisfy the clerk that he would have voted in either of said three elections, if the same had been holden within his reach, is entitled to a certificate, and may vote if he is known to the judges of election to have been a true friend to the government of the United States."

But the question still remains whether the relator, in the facts which he states in his petition, is entitled to vote under the law, and to a mandamus peremptory on the defendant. He must show a specific and complete right to vote, before the court can award him a peremptory mandamus. (An. and Amion Corp., p. 652.) Then has he shown such a right? It must be observed that the broad allegation that the relator is a loyal citizen of the State, and of the United States, and is entitled to vote under the constitution and laws of the State, is insufficient. He must show specific facts. Besides this, the petition shows that the relator does not regard the act of June 5, 1865, as a part of the law of the State.

Can he vote under the first clause of the first section of the act? To question 1 propounded by the clerk, he answers: "I was not, to my knowledge, publicly known to have entertained Union or loyal sentiments from the outbreak of the rebellion," without alleging that he did entertain such sentiments. This answer is conclusive against him on that point. It may be and I think is true that the defendant Ware had no right to require proof of such loyalty by two witnesses. But this is not at all important in this case, as the petitioner did not offer any proof of such loyalty, and shows himself that it did not exist. It is not pretended that the relator is entitled to vote under either the 2d, 4th, or 5th clauses of the first section. It was urged in the argument, not seriously, however. I think that he can vote under the 3d clause, because he came from Kentucky about eighteen years ago. It is so apparent that the legislature meant that the removal from another State must have been since the outbreak of the rebellion, that it is unnecessary to say anything on that subject.

The relator shows that he did not vote at either of the three elections mentioned in the act, and does not show that he would have voted in either of them if it had been holden in his reach. On the contrary, he says that he did not vote "for reasons satisfactory to himself, and into the character of which the said Ware had no official right to inquire." He therefore cannot vote under the 6th clause of the first section of the act.

After a careful and anxious investigation of the subject, I have come to the conclusion that the relator, on his own showing, is not entitled to the privilege of voting. The result then, is, that the peremptory mandamus must be refused, the motion to dismiss allowed, and the petition dismissed.

MAIL ROUTE.

MEMORIAL

OF

THE LEGISLATURE OF WISCONSIN,

IN FAVOR OF

The establishment of a mail route from the city of Milwaukee to Painsville, in said State.

FEBRUARY 4, 1867.—Ordered to be printed.

To the honorable the Senate and House of Representatives of the United States in Congress assembled.

The memorial of the legislature of the State of Wisconsin respectfully represents that the interest and convenience of a large population would be greatly enhanced by the establishment of a weekly mail route from the city of Milwaukee *via* New Koeln, in the township of Lake, to Painsville, in the township of Franklin, in the county of Milwaukee, in the State of Wisconsin, being a distance of about fourteen miles; and your memorialists therefore respectfully ask that said mail route be established as herein set forth.

ANGUS CAMERON,
Speaker of the Assembly.
WYMAN SPOONER,
President of the Senate.

Approved January 26, 1867.

LUCIUS FAIRCHILD, *Governor.*

STATE OF WISCONSIN, *Secretary's Office, ss:*

The secretary of state of the State of Wisconsin hereby certifies that the foregoing has been compared with the original memorial deposited in this office, and that the same is a true and correct copy thereof, and of the whole of such original.

In witness whereof, I have hereunto set my hand and affixed the great seal of the State, at the capitol in Madison, this 30th day of January, A. D. 1867.

[SEAL.]

THOS. S. ALLEN,
Secretary of State.

MEMORIALS AND RESOLUTIONS
OF
THE CENTRAL EXECUTIVE COMMITTEE
OF THE
Republican Party of Louisiana.

DECEMBER 11, 1866.—Referred to the Committee on Reconstruction and ordered to be printed.

The Central Executive Committee of the Republican party of Louisiana to the Congress of the United States :

FELLOW-CITIZENS : In the name of those who love their country and hate its enemies, in the name of those who love liberty and hate tyranny, we appeal to you, as the faithful representatives of the American people, as our brothers, to protect the lives, the liberty, and the property of the loyal people of Louisiana; to establish here a government loyal to the nation, a government founded on justice to all, under which all good citizens, regardless of caste or color, shall enjoy equal civil and political rights. Surely you have the power to do so; justice demands it; the safety of the nation demands it.

When the bold, bad men of the rebellion attempted to destroy the government, when they seized its forts, its arsenals, its mints, and its navy-yards, destroyed its light-houses, sent out upon the ocean their pirate ships to prey upon its commerce, conscripted its citizens into their army, confiscated the property of loyal men, and violated all laws, human and divine, to accomplish their unholy object, then it was too late to appeal to the Constitution, too late to use any argument but that of force, and the nation, exercising the natural right of self-defence, arose in its might, and, with musket and rifle and cannon, scattered the rebel hordes, destroyed their power, (we did hope forever,) abolished the barbarous institution of human slavery, and, whether constitutionally or not, made all men free and equal who were true to the government.

Shall it be said of the American people that, after fighting for four years, at the sacrifice of thousands of precious lives, they are now ready to surrender their power to conquered enemies, who, having in vain tried to destroy the Constitution, now claim its protection? Shall the loyal men of Louisiana be delivered, bound hand and foot, to the mercy of those who, after having surrendered on the battle-field, committed the atrocious murders of July 30 at New Orleans? Are such monsters to be conciliated at our expense?

To whom shall we appeal but to you for redress of grievances? We have a rebel State government, rebel legislature, rebel parish officers, a rebel police force, a rebel public sentiment, maintaining a rebel press, a rebel church, a rebel bar. We have a swarm of ex-rebel soldiers ready, "when the proper time arrives," to precipitate the southern States into another revolution. These men—the misguided followers of such guilty leaders as Slidell and Benjamin, Dick Taylor and Beauregard—were not only conquered but subdued, willing and anxious to accept any terms which their conquerors might dictate. Now, thanks

to the crazy policy of the accidental President of the United States, they have taken new courage; they are proud of what they were once ashamed of; they boast of their efforts to destroy the government; they persecute loyal black men; they point the finger of scorn at loyal white men; they take part in riots and massacre Union men almost in sight of the federal troops.

Fellow-citizens, we do not hesitate to assert that Andrew Johnson, President of the United States, by his desertion of his own avowed principles, has brought about this deplorable state of affairs not only in Louisiana but throughout the seceding States; we believe that he should be called to a strict account for his acts immediately, and if found delinquent removed from office.

We do not ask for vengeance on our enemies, though they would destroy us; we ask for justice only. We ask you to give us a government in this State in which only the loyal, both white and black, shall participate; and we do solemnly declare that, in our opinion, there can be no peace, no security, no real liberty in Louisiana until such a government shall have been established.

Willing as we are to forgive the past offences of those who, having sinned against the government, are now sincerely repentant, we are at the same time opposed to any compromise with its known enemies. We do not believe in submitting constitutional amendments to rebel legislators who glory in having served the defunct confederacy. We protest against the continuance of the present so called State government of Louisiana. We ask you to abolish it, and substitute one composed of those who require no Executive pardons before they enter upon the duties of their offices. Do these things and the loyal people of Louisiana will ever hold in grateful remembrance the members of the thirty-ninth Congress.

The above was unanimously adopted and ordered to be signed by the president and secretary, in the name of the committee.

W. R. CRANE, *President.*

JOS. L. MONTIEU, *Secretary.*

RESOLUTIONS.

1. *Resolved*, That the central executive committee of the republican party of Louisiana petition the thirty-ninth Congress of the United States for, and will sustain it in, the impeachment and removal from office of Andrew Johnson, President of the United States, a traitor to his trust, and a sympathizer with the rebels, bestowing upon them the enormous executive patronage, for which he displaced loyal and true men; a usurper of the powers of Congress, the legislative department of the government, and the faithful representatives of the people; the abuser of executive power, exercised in favor of rebels by the wholesale restoration of confiscated property justly forfeited to the United States to pay the war debt, and consequently depleting of the national treasury, and increasing of the already burdensome taxation of the loyal people; he adopted a reconstruction policy exclusively for the benefit of rebels, and failed to arrest and punish the perpetrators of the cruel massacre of the loyal people of New Orleans, on the 30th of July last.

2. *Resolved*, That, in the opinion of this committee, the thirty-ninth Congress should abolish the present rebel State government of Louisiana, and establish a loyal territorial government, with a military or provisional governor therein in harmony with the verdict of the American people, as expressed at the late elections; and also provide for a State government therein on the basis of universal suffrage, and by appropriate congressional action establish universal suffrage throughout the United States.

W. R. CRANE, *President.*

JOS. L. MONTIEU, *Secretary.*

A. H. JONES.

CREDENTIALS

OF

ALEXANDER H. JONES,

A

Representative from North Carolina.

DECEMBER 11, 1866.—Referred to the Committee on Reconstruction and ordered to be printed.

STATE OF NORTH CAROLINA.

To the Hon. Alexander Hamilton Jones, greeting :

Whereas it has been certified by the sheriffs of the several counties composing the seventh congressional district of this State that you have been duly elected to represent the said district in the House of Representatives in the Thirty-ninth Congress of the United States, I do, therefore, hereby commission you a representative of the State aforesaid, with all the rights, privileges, and immunities conferred by the Constitution on members of said House, your said election having been conducted according to the laws of North Carolina and of the United States.

In witness whereof, his Excellency Jonathan Worth, our governor, captain-general, and commander-in-chief, hath signed with his hand these presents, and caused our great seal to be affixed thereto.

Done at the city of Raleigh, on the 8th day of January, A. D. 1866, and in the ninetieth year of our independence.

[SEAL.]

By the governor :

JONATHAN WORTH.

WM. H. BAYLEY,
Private Secretary.

REVENUE CUTTER SERVICE.

[To accompany bills H. R. 899 and 900.]

LETTER

FROM

THE SECRETARY OF THE TREASURY,

DIRECTED TO

Hon. E. B. Washburne, chairman of the Committee on Commerce, relative to the revenue service.

DECEMBER 17, 1866.--Ordered to be printed.

TREASURY DEPARTMENT,
December 10, 1866.

SIR: I have the honor to transmit, for the consideration of your committee, draughts of a joint resolution making appropriations for the revenue cutter service, and of a bill to fix the compensation of the officers in that service; both of them regarded by this department as of especial importance and worthy the favor of Congress.

The calculations and estimates on which they are based will be found embodied in the schedule accompanying.

A definite appropriation for the cutter service is considered necessary, so that the expenditures may be properly controlled, defined, and separated from the miscellaneous expenses of the revenue service.

As already explained in the late annual report to Congress, it has been found impracticable to sell the steam cutters now in commission, until some provision shall have been made to supply their places on the cruising grounds. Contracts have been accordingly concluded for the construction of a number of sailing vessels, and for the purchase of two small steamers on the terms designated in the enclosed schedule, and appropriations are asked to enable the department to carry out the arrangement. It will be observed that no draft on the public treasury, on this account, is ultimately intended, since it is expected that the proceeds of the contemplated sales will replace the sum asked for.

In favor of the bill fixing the salaries of the officers of the revenue marine it is hardly necessary that any explanation should be made. The justice as well as the necessity of the measure cannot but be apparent upon consideration of the arduous duties which devolve upon this branch of the public service, and of the entire inadequacy of the compensation established by the act of July 25, 1861. The rates now proposed are still far below the compensation of officers of corresponding rank in the navy.

I can only say in addition that the measure meets my own hearty approval and indorsement.

It will be noticed that these bills are both limited to take effect on the first proximo, it being regarded important that the changes, if sanctioned, should go into operation at as early a date as possible.

I am, sir very respectfully,

HUGH McCULLOCH,
Secretary of the Treasury.

Hon. E. B. WASHBURNE,
Chairman Committee on Commerce, House of Representatives.

A.—Steamers.

REVENUE CUTTER SERVICE.

3

Name of steamer.	Class.	Tons.	Number of crew.	Pay of crew for one year.	No. of tons coal required.	Amount required for deck department.	Amount required for engineer department.	No. of rations for one year.	Remarks.
1 Cuyahoga	First	550	50	\$18,180	960	\$2,400	\$2,800	18,250	36 captains, at \$1,800.....
2 Lincoln	do	530	50	18,180	960	2,400	2,800	18,250	36 first lieutenants, at \$1,400.....
3 Wayanda	do	450	46	16,620	960	2,400	2,800	16,790	36 second lieutenants, at \$1,200.....
4 Ashuelot	Second	350	40	14,700	840	2,000	2,400	14,600	40 third lieutenants, at \$900.....
5 Mahoning	do	350	40	14,700	840	2,000	2,400	14,600	26 chief engineers, at \$1,400.....
6 Kewanee	do	350	40	14,700	840	2,000	2,400	14,600	26 first assistant engineers, at \$1,200.....
7 Kankakee	do	350	40	14,700	840	2,000	2,400	14,600	30 second assistant engineers, at \$900.....
8 Pawtuxet	do	350	40	14,700	840	2,000	2,400	14,600	230
9 Hugh McCulloch	do	480	40	14,700	960	2,000	2,400	14,600	
10 Andrew Johnson	do	480	40	14,700	500	1,200	1,400	14,600	
11 Salmon P. Chase	do	480	40	14,700	500	1,200	1,400	14,600	
12 William P. Fessenden	do	480	40	14,700	500	1,200	1,400	14,600	
13 John A. Dix	do	480	40	14,700	500	1,200	1,400	14,600	
14 John Sherman	do	480	40	14,700	500	1,200	1,400	14,600	
15 Commodore Perry	do	350	40	14,700	500	1,200	1,400	14,600	
16 Shubrick	do	350	40	14,700	840	1,800	2,000	14,600	
17 Miami	Third	220	32	13,000	720	1,400	2,000	11,680	
18 Delaware	do	360	34	13,500	840	1,600	2,000	12,410	
19 Wilderness	do	360	32	13,000	840	1,400	2,000	11,680	
20 Northerner	do	320	30	10,800	720	1,400	2,000	10,950	
21 Nansemond	do	320	30	10,800	720	1,400	2,000	10,950	
22 Nemaha	do	280	28	10,000	720	1,400	2,000	10,220	
23 William H. Seward	do	220	24	9,600	600	1,400	1,800	8,760	
24 E. A. Stevens	do	180	24	9,600	600	1,200	1,800	8,760	
25 Moccasin	do	196	24	9,600	600	1,200	1,800	8,760	
26 Bronx	Fourth	120	20	8,400	540	1,200	1,600	7,300	
Total		9,436	942	352,380	18,780	41,800	52,200	344,560	

REVENUE CUTTER SERVICE.

B.—*Sailing vessels.*

	Name of letter.	Tons.	Number of crew.	Pay for crew one year.	Rations for one year.	Deck department.
1	Dobbin.....	160	25	\$9,120 00	9,125	\$1,200 00
2	Crawford.....	160	25	9,120 00	9,125	1,200 00
3	Morris.....	160	25	9,120 00	9,125	1,200 00
4	Campbell.....	150	25	9,120 00	9,125	1,200 00
5	Jo. Lane.....	180	25	9,120 00	9,125	1,200 00
6	Thompson.....	80	20	7,220 00	7,300	1,000 00
7	Black.....	80	20	7,220 00	7,300	1,000 00
8	Antietam.....	90	20	7,220 00	7,300	1,000 00
9	Lancey.....	80	20	7,220 00	7,300	1,000 00
	Total.....	1,140	205	74,480 00	74,825	10,000 00

RECAPITULATION.

Steam and sailing vessels.

Pay of officers	\$289,000 00
Pay of crews	526,860 00
419,385 rations, at 35 cents.....	146,784 75
18,780 tons of coal, at \$10 per ton.....	187,800 00
Deck department.....	51,800 00
Engineer's department.....	52,200 00
Repairs on 26 steamers for one year, average each \$6,000.....	156,000 00
Repairs on 9 sailing vessels for one year, average each \$3,000.....	27,000 00
Total	<u>1,337,444 75</u>

For the purchase of steam-tug D. A. Mills, for Boston harbor	\$16,000 00
For the purchase of steam-tug Mosswood, for Eastport and coast of Maine	12,000 00
For building two topsail schooners, 230 tons, \$29,000 each.....	58,000 00
For outfits, cabin, ward-room, and berth-deck furniture, armament, &c., \$6,000 each	12,000 00
For building six schooners, of 120 tons, \$18,500 each.....	111,000 00
For outfits, cabin, ward-room, and berth-deck furniture, armament, &c., \$5,000 each	30,000 00
For commutation for quarters, &c.....	10,000 00
For travelling expenses, &c.....	10,000 00
Total.....	<u>259,000 00</u>

Should Congress increase the pay of captains from \$1,800 to \$2,500, first lieutenants and chief engineers from \$1,400 to \$1,800, second lieutenants and first assistant engineers from \$1,200 to \$1,500, third lieutenants and second assistant engineers from \$900 to \$1,200, there will be required the sum of \$89,600, as follows:

Thirty-six captains, increase \$700 each	\$25,200 00
Thirty-six first lieutenants, increase \$400 each	14,000 00
Thirty-six second lieutenants, increase \$300 each	10,800 00
Forty third lieutenants, increase \$300 each.....	12,000 00
Twenty-six chief engineers, increase \$400 each	10,400 00
Twenty-six first assistant engineers, increase \$300 each.....	7,800 00
Thirty second assistant engineers, increase \$300 each	9,000 00
Total.....	<u>89,600 00</u>

CODIFYING THE LAWS OF DAKOTA TERRITORY.

MEMORIAL

OF THE

LEGISLATURE OF DAKOTA TERRITORY,

ASKING

That the Secretary of said Territory be authorized to use what has been saved out of the appropriations made for legislative expenses of the Territory, for the purpose of codifying the laws.

JANUARY 3, 1867.—Ordered to be printed and referred to the Committee on the Territories.

A MEMORIAL to Congress asking that the secretary of the Territory be authorized to use what has been saved out of appropriations made for legislative expenses of the Territory of Dakota, for the purpose of codifying the laws.

Your memorialists, the legislative assembly of the Territory of Dakota, would respectfully represent that the laws of Dakota enacted from time to time need revision and codification, and for this purpose would recommend and pray that the secretary of the Territory be authorized to use the money already appropriated for legislative expenses of the Territory of Dakota which may have been saved, and the money which may be saved out of such appropriations for the next fiscal year, for the purpose of paying the expenses of such codification, provided that not more than ten thousand dollars shall be expended for this purpose.

Resolved, That our delegate in Congress be respectfully requested to bring the foregoing to the immediate attention of Congress, and use all honorable means to secure the object of this memorial.

J. B. S. TODD, *Speaker*.

M. K. ARMSTRONG, *President*.

F. WIXSON, *Chief Clerk*.

B. M. SMITH, *Secretary*.

Approved December 13, 1866.

A. J. RAULK, *Governor*.

I hereby certify that the above is a true and correct copy of a memorial to the Congress of the United States now on file in my office, which passed the legislature of the Territory unanimously and received the approval of the governor on the 13th day of December, 1866.

In testimony whereof, I have hereunto set my hand and affixed the great
[SEAL.] seal of the Territory at Yankton this 13th day of December, A. D.
1866.

S. L. SPINK,
Secretary of Dakota Territory.

COMMITTEE ON THE IOWA TERRITORY

MEMORANDUM

LEGISLATURE OF IOWA TERRITORY

The Committee on the Iowa Territory has the honor to acknowledge the receipt of your letter of the 10th inst. in relation to the proposed amendment to the constitution of the Territory, and in reply to inform you that the same has been referred to the proper authorities for their consideration.

A bill was introduced into the House of Representatives of the Territory on the 10th inst. for the purpose of amending the constitution of the Territory, and the same was referred to the Committee on the Constitution. The Committee has the honor to acknowledge the receipt of your letter of the 10th inst. in relation to the proposed amendment to the constitution of the Territory, and in reply to inform you that the same has been referred to the proper authorities for their consideration.

Very respectfully,
J. A. JOHNSON, Chairman.

J. A. JOHNSON, Chairman.
J. A. JOHNSON, Chairman.
J. A. JOHNSON, Chairman.

I hereby certify that the above is a true and correct copy of a resolution of the House of Representatives of the Territory, passed on the 10th inst. in relation to the proposed amendment to the constitution of the Territory, and in reply to inform you that the same has been referred to the proper authorities for their consideration.

TO AMEND THE ORGANIC ACT OF MONTANA TERRITORY.

JOINT RESOLUTION

OF THE

LEGISLATIVE ASSEMBLY OF MONTANA,

ASKING

Congress to amend the organic act.

JANUARY 3, 1867.—Ordered to be printed and referred to the Committee on the Territories.

JOINT RESOLUTION asking Congress to amend the organic act so as to increase the pay of the federal officers, as also the per diem of the members of the legislative assembly of Montana Territory.

Whereas, owing to the high prices of living in this Territory, the governor, secretary, and judges of the supreme court, as also the members of the legislative assembly, cannot perform the functions of their offices with the allowances at present provided, without being subject to many and divers deprivations; that their salaries and per diem are scarcely sufficient to defray the actual expenses of living, leaving no remuneration for their time; and

Whereas, at the second session of the legislative assembly of Montana Territory, a joint resolution was passed, requesting your honorable body to amend the organic act as herein requested, but whether said resolution was ever presented to your honorable body this body has no means of knowing; and

Whereas it appears upon actual calculation that the annual appropriation of twenty thousand dollars for legislative expenses of Montana Territory, made and provided annually for such purposes, is sufficient of itself to admit of an increase of the per diem of members of the legislative assembly from four (4) dollars to eight (8) dollars per diem without further appropriations on the part of Congress; and

Whereas the United States collector of internal revenue has collected of the people of this Territory (see governor's message for the fiscal year ending June 30, 1866) the sum of one hundred and fourteen thousand and twenty-three dollars and fifty-two cents; that our people are patient, law-abiding, and lovers of the principles of constitutional liberty; that while we remain in a territorial condition and the federal government assumes to defray the expenses of our territorial government, and while our people continue to pay the taxes imposed upon them by the federal laws, which are paid cheerfully, we shall deem it but a matter of justice to the people as well as to those whose duty it is made to execute, administer, and make laws, that the officers herein mentioned should receive such compensation as will enable them to maintain themselves as becomes the honor and dignity of their offices:

Be it therefore resolved by the legislative assembly of the Territory of Montana as follows:

That the Senate and House of Representatives of the United States of America in Congress assembled are hereby earnestly requested to amend the organic act of the Territory of Montana, so as to increase the salaries of the governor, secretary, and judges of the supreme court of this Territory to four thousand dollars per annum, and to increase the per diem of the members of the legislative assembly to ten dollars per diem, or such salaries per diem as, in the wisdom and justice of your honorable body, may seem meet.

That his excellency Green Clay Smith, governor of the Territory of Montana, be and he is hereby requested to forward a copy of this resolution to the Speaker of the House of Representatives and President of the Senate, and also to forward a copy to our delegate in Congress, Colonel Samuel McLean, and request that he use all honorable means to secure such amendments as are herein set forth.

A. E. MAYHEW,

Speaker of the House of Representatives.

CHARLES S. BAGG,

President of the Council.

Approved November 30, 1866.

GREEN CLAY SMITH,

Governor Montana Territory.

APPROPRIATIONS FOR SURVEYS, &c.

MEMORIAL

OF THE

LEGISLATIVE ASSEMBLY OF MONTANA,

ASKING

For appropriations for surveys and the establishment of a surveyor general's office, and also for a land office in Montana Territory.

JANUARY 3, 1867.—Ordered to be printed and referred to the Committee on Appropriations.

JOINT MEMORIAL to Congress asking for appropriations for surveys and the establishment of a surveyor general's office, and also for a land office in Montana Territory.

To the Senate and House of Representatives of the United States of America in Congress assembled :

We, your memorialists, the legislative assembly of the Territory of Montana do respectfully represent to your honorable body that whereas, by treaties made between the United States and various Indian tribes inhabiting Montana Territory, the Indian title to a large portion of the land in this Territory has been extinguished ; and

Whereas settlements have been made in the valleys of the Jefferson, Madison, and Gallatin forks of the Missouri, upon the tributaries of the Missouri below the Three Forks, and also in the valleys of the Deer Lodge, Little Blackfoot, Hell Gate, and Bitter Root rivers, which settlements comprise a farming population of over three thousand souls ; and whereas the people of this Territory are anxious to have the land upon which they reside surveyed, in order that titles to the same can be acquired under the operation of the pre-emption and homestead laws of the United States :

Now we, your memorialists, would respectfully urge upon your honorable body the appropriation of money for the purpose of executing the public surveys through these mountain valleys and plains, at as early a date as possible, and would request that a surveyor general's office be established, and a land office be also created within the Territory.

A. E. MAYHEW,

Speaker of the House of Representatives.

CHARLES S. BAGG,

President of the Council.

Approved December 4, 1866.

GREEN CLAY SMITH,

Governor.

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FREEDMEN IN ARKANSAS.

LETTER

FROM

GENERAL E. O. CORD,

IN RELATION TO

The treatment of freedmen in Arkansas.

JANUARY 4, 1867.—Referred to the Committee on Reconstruction and ordered to be printed.

BUREAU REFUGEES, FREEDMEN, AND ABANDONED
LANDS FOR ARKANSAS AND INDIAN TERRITORY,
Little Rock, Arkansas, November 24, 1866.

GENTLEMEN: I have the honor to acknowledge the receipt of your communication of the 22d instant, requesting information relative to the "treatment of freedmen in this State."

In reply thereto I respectfully submit the following:

As to the treatment of freedmen by employers, relative to the settlement of contracts for labor, I will give the following extract from the report of Major Watson, superintendent, &c., Jacksonport, under date of August 31, who states relative to counties in which there is no agent of this bureau:

"In many instances the freedmen, having worked faithfully for their employers, are now being turned away without any compensation. These instances occur in localities so far distant from any agent that it is impossible to have such claims adjusted through the agency of the bureau; and to make their claims through the civil authorities would be useless."

Captain Cole, at Camden, reports, July 31, of Union county:

"I find affairs there deplorable in the extreme. Several freedmen have been murdered under circumstances of great atrocity; others, on the laying by of crops in which they were interested as remuneration for their labor, have been run away from their homes, and their lives threatened if they returned or made complaint to this office. The feeling there against the freedmen is most intense and bitter. In confirmation of these facts I have on file many affidavits containing testimony of the most incontrovertible character."

Again, September 30, Captain Cole reports:

"There will, in my opinion, be very little chance for freedmen to get their just dues from planters unless they are compelled to come to the office of the superintendent when the settlement takes place. The people persist in trying to defraud the freedmen in every conceivable way."

Lieutenant Mix reports from Osceola, Mississippi county, in letter dated October 31 :

"I have released three colored persons from slavery, one of whom was a woman, having been held for the last three years without any pay or agreement for pay, her life having been threatened if she left. She was badly beaten and horse-whipped several times ; all of which is sworn to. The other two, man and wife, were under contract at fifteen cents a day, with their lives threatened if they attempted to leave the plantation."

Reports are being monthly received from nearly all sections of the State, showing a disposition on the part of the employers to defraud the freedmen out of their dues. The above extracts are given as illustrations.

The following is an extract from the official report of Brevet Major General Sprague, late assistant commissioner, dated October 18 :

"I give it as my opinion that the freedmen of Arkansas will be defrauded the present year out of fully one-third of their just dues. Doubtless there can be found men in every community who would scorn such baseness, but they are too few to make their scorn felt by the community at large."

In relation to the treatment the freedmen receive from the local civil officers throughout the State, I will say that, with few exceptions, justice has not been nor is impartially administered. The civil officers of Helena and vicinity are exceptions.

Brevet Major Sweeney reports, October 31 :

"The various justices, so far as I can learn, appear to be exercising the duties of their office with impartiality and justice. Any freedman can obtain legal redress as readily as white persons. * * * *

"Some of the oldest lawyers in Helena undertake their cases."

Outrages, assaults, and murders committed upon the persons of freedmen and women are being continually reported from nearly all sections of the State, and a decided want of a disposition to punish the offenders apparently exists with the local civil officers and in the minds of the people.

There have been reported fifty-two (52) murders of freed persons by white men in this State to this office in the past three or four months, and no reports have been received that the murderers have been imprisoned or punished.

In some parts of the State, particularly in the southeast and southwest, freedmen's lives are threatened if they report their wrongs to the agent of the bureau ; and in many instances the parties making reports are missed and never heard of afterwards. It is believed that the number of murders above reported is not half the number actually committed during the time mentioned.

I am, very respectfully, your obedient servant,

E. O. C. ORD,

Brevet Major General U. S. Army, Assistant Commissioner.

By O. D. GREENE,

Assistant Adjutant General, in absence of the General.

Official copy :

JOHN TYLER,

Brevet Major of Volunteers, Acting Assistant Adjutant General.

ARKANSAS.

LETTER

FROM

A. W. BISHOP, ADJUTANT GENERAL OF ARKANSAS,

RELATIVE TO

The treatment of Union men in that State.

JANUARY 4, 1867.—Referred to the Committee on Reconstruction and ordered to be printed.

SENATE CHAMBER, November 14, 1866.

DEAR SIR: The joint committee of the senate and house of representatives desire that you furnish such information as may be in your possession in relation to the "development of a proscriptive party spirit in portions of the State," referred to in the late message of his excellency Governor Murphy, together with the measures adopted to suppress the same.

Respectfully,

W. HICKS,

Chairman Senate Committee.

W. H. BROOKS,

Chairman House Committee.

General A. W. BISHOP,
Adjutant General.

HEADQUARTERS, STATE OF ARKANSAS,

Adjutant General's Office, Little Rock, November 16, 1866.

GENTLEMEN: In reply to your communication of the 14th instant, in which I am asked by the joint committee of the senate and house of representatives to furnish such information as may be in my possession in relation to the "development of a proscriptive party spirit in portions of the State," referred to in the late message of his excellency Governor Murphy, together with the measures adopted to suppress the same, I have the honor to state, that from time to time during the past year, but more particularly since the general election in August last, numerous letters have been received both at this office and by the executive of the State that indicate the existence of the spirit referred to. The attention of the executive has also been called to the fact, and this office has been informed that similar communications have been received at headquarters of the department of the Arkansas by the officers in charge of the Freedmen's Bureau for the State, and those at the head of the Internal Revenue department. These communications are generally of a private character, and of such I do not consider myself at liberty to disclose the names of the writers.

Some, however, are submitted, and the substance of the remainder is substantially this: that in many portions of the State those citizens who advocated the cause of the general government during the late war, and especially those who took up arms in its defence, are now insecure in their persons and property, and cannot receive impartial justice from the civil tribunals; that their lives have been threatened, and several murders committed, for no known cause except adhesion to the government of the United States, or the seizure of property under military order in time of war.

Copies of the following communications received at headquarters department of the Arkansas are on file in this office, and a transcript thereof is respectfully furnished :

HEADQUARTERS POST OF BATESVILLE, ARKANSAS,
September 25, 1866.

SIR : I have the honor to enclose herewith copy of an order issued by me to the sheriff of Fulton county, and also affidavits of the citizens to the facts in the case of Simpson Mason, superintendent refugees, freedmen and abandoned lands of Izard county.

By reference to the post letter-book I find that this case was investigated and reported to headquarters department of Arkansas on the 25th of June, 1866. The letter is not signed, so I cannot tell by whom the report was made.

I have taken pains to inquire particularly of this case among reliable men, and believe the facts to be as stated in the affidavits.

Captain Mason has undoubtedly rendered good service to the government of the United States, both during and since the war, in consequence of which he is universally hated by the rebels, and I am convinced that no efforts would be spared to drive him from the country.

He is regarded as one of the most reliable Union men in this part of the country, and I am satisfied that the acts committed by him were done in what he considers the line of his duty.

In this communication I would also state, that it seems to me that here offences of this nature are only prosecuted against Union men, and not against those who were rebels.

The prosecuting attorney for this district, Mr. Padgett, told me that "the grand jury will seize every opportunity to indict Union men for old offences, but no power on earth can induce them to indict a bushwhacker or a rebel." This is, perhaps, too strong an assertion, but I believe it to be in a great measure true.

Very respectfully, your obedient servant,

WALTER O. LATTIMORE,

Captain 19th U. S. Infantry, Commanding Post.

Lieutenant HUGH G. BROWN,

A. A. A. General, Department of Arkansas.

HEADQUARTERS POST OF BATESVILLE, ARKANSAS,
September 25, 1866.

SIR : It is represented at these headquarters by Simpson Mason, that two indictments are now pending against him in Fulton county, one for the murder of Hollingsworth and Payne, and the other for stealing a horse ; and that the said Hollingsworth and Payne were rebels and bushwhackers, and were killed by him while in the discharge of his duty as a United States soldier, and that the horse was taken by him for the use of the government and was afterwards returned.

The affidavits of two men who were with him at the time are presented in

support of the above. You are hereby directed not to serve a writ of capias upon the person of Mr. Mason, or to in any way molest him on account of any proceedings had against him for any acts committed against the said Hollingsworth and Payne, or for taking the said horse, or for any acts committed by him in the discharge of his duty, while the country was overrun by the rebel forces.

Respectfully, your obedient servant,

W. O. LATTIMORE,

Captain 19th U. S. Infantry, Commanding Post.

The SHERIFF of *Fulton County, State of Arkansas.*

STATE OF ARKANSAS, *Independence County :*

This is to certify that I am well acquainted with Captain S. Mason, and have been for several years, and know him to have been a commissioned captain by the governor of Arkansas ; and I further state that, from the best authority, one John Hollingsworth and one Samuel Payne, who are reported to have been killed by Captain S. Mason, were rebels of the worst character ; and I do further certify that Captain S. Mason was acting under his commission at the time the said Hollingsworth and Payne were reported to have been killed ; and I do further certify that the above statements can be substantiated by a number of good loyal citizens of Fulton county, Arkansas.

Given under my hand on this the 24th day of September, A. D. 1866.

J. W. KINNEY.

Sworn and subscribed before me, this 24th day of September, 1866.

URIAH MAXFIELD,

Justice of the Peace.

STATE OF ARKANSAS, *County of Independence :*

This is to certify that I am well acquainted with Captain S. Mason, of Fulton county, Arkansas, and know that he was a commissioned officer of the State, in the State service, subject to the orders of the United States forces within the State of Arkansas ; and I further certify that one John Hollingsworth and one Samuel Payne, who are reported to have been killed by the said Captain S. Mason, in the year 1865, were notorious rebels, bushwhackers, murderers, and robbers, which facts can be established by a number of good, loyal citizens of Fulton county.

This the 22d day of September, 1866.

JOHN T. CRAFTON.

From the county of Pope a communication has been received by his excellency the governor of the State, under date of September 10, 1866, representing that the county is on the eve of serious trouble ; that the citizens are being murdered by unknown men ; that no one is safe, and that it is all thinking men can do to prevent a general outbreak. It is represented also that many good citizens are compelled to "sleep in the brush," and military aid is earnestly asked for. Since the re-establishment of civil law in that county, two sheriffs, A. D. Napier and William H. Williams, and William Stout, clerk of the circuit court for the county, all of whom were known as Union men, have been murdered.

Latterly a document of which the following is a copy, and which, it is represented, was circulated somewhat at and in the vicinity of the county seat of the county where found, has been brought to the notice of this office. Its character is, to say the least, diabolical, and though it may be the emanation of a single depraved mind, inasmuch as it has produced additional apprehensions of personal violence, I have thought proper to submit it to you :

[Despatch.]

BRIGPORT HELL, *August 31, 1866.*

Gentlemen of Pope County :

SIRS : You seem to be troubled with a man-eater. I am glad that he has made his appearance in your county. It is no more than I expected, and I am in need of some more men. Mr. Williams has made his trip through safe; he says Ray will be here to-morrow. As he was troubled with his burns he lay over a day. Mr. Mankiller, you will please send me several more as soon as you can conveniently. I have found a new country two degrees south of *El Campo Diable*. I am in need of all the men I can get in Pope—such men as you, sir Mankiller, send me. Please sent me more as good as those you have sent me.

We want some officers. Captain Clear is a good man—sent him; and Major Mason, of Lewisburg, would just suit me—sent him; two of the Brown boys I want, so the citizens of Pope county need not be holding meetings to prevent me from getting those men, for I will have them.

Such men as I have named I want, and no others will I have in my new kingdom. The old devil may have them, but I want such men as I call for. I know many don't want to go as privates, and all the offices are filled in the old kingdom. This is why I came to prospect for a new country, so I am commander-in-chief of my kingdom. The man-killer has thirteen sons; eleven out of the thirteen are perfectly well trained. They can kill a man without having any conscientious scruples, so you can't think anything of his taking two or three men out of your county a week, as he has such a large family; so no more at this time.

I was once your honorable servant, but could not stay with you.

BILL STOUT.

The authorship of this document is believed to be known.

Complaints of threats, of personal violence, and in several instances of the murder of Union men, come also from the counties of Johnson, Carroll, Marion, Independence, Perry, Sevier, Ouachita, Hot Springs, St. Francis, Craighead, and others, and it is charged in some of them that the civil authorities make no efforts to arrest the perpetrators of these crimes. In some instances the facts are sworn to, and the information generally is considered worthy of attention.

From time to time during the past six months advices have been received by the executive of the State, and at this office, of the murder of Union men for alleged offences, prosecution for which is forbidden by General Orders No. 3, War Department, Adjutant General's Office, Washington, January 12, 1866, entitled "An order to protect loyal persons against improper civil suits and penalties in late rebellious States."

The attention of the commander of the department of Arkansas has also been called to this subject, and in a communication from Major General J. J. Reynolds, then commanding the department, to D. C. White, esq., clerk of the circuit court for the county of Jefferson, dated Little Rock, April 20, 1866, it was directed that prosecutions in certain cases alleged to come within this order should be dismissed, unless satisfactory evidence could be produced to depart-

ment headquarters that the prosecutions were not based upon the actions of the defendant during the late war.

It was further directed that the provisions of the order above referred to be strictly complied with, and that when it appeared that any suit brought or attempted to be brought before the courts was of the nature of those therein named, no action be taken; or if suit was already in process, that it be at once dismissed.

It was further stated in this communication, that parties engaged in hostilities against the government, and in plundering their neighbors while acting with the rebel forces in the late war, were not proceeded against for such acts, and that these parties would not be permitted to proceed against those who acted under the authority of the United States, for acts of a like nature.

It has come to the knowledge of the executive of the State, that during the canvass preceding the general election in August last, some of the candidates for the legislature in Washington county were prevented by ex-Union soldiers from speaking in certain precincts, and that after the election the poll-books at Fayetteville, in said county, were partially destroyed by the same parties, or those in sympathy with them.

Such conduct was disapproved entirely by Governor Murphy, and to a communication from the clerk of the circuit court for said county, asking, among other things, for instructions as to the course to be pursued in the emergency, the following reply was made :

EXECUTIVE OFFICE, LITTLE ROCK, ARKANSAS,
September 20, 1866.

DEAR SIR : Yours of September 14th is received and has been duly considered. My official duty requires me to see that the laws are faithfully executed.

The burning of the poll-books was a bold violation of law and should be punished. It cannot be excused. No provocation will excuse. The deed is done, and it becomes every good citizen to repair the wrong, if possible.

I presume the judges of election kept duplicates; if so, they should file copies of the same in your office, properly authenticated by their affidavits, abstracts of which you should forward to the secretary of state's office, with a full statement of the facts. This course would relieve you from all responsibility and put the whole case in a proper condition to be adjudicated. As it stands I have no power to issue writs of election.

This is the only course that I think safe for you, and it seems to me to be the legal and right plan. We are impatiently waiting for some certified return from you. Washington is the only county from which we have received no proper election returns.

I trust that you will be as prompt as possible in putting this thing in shape and forwarding your abstract.

With high respect,

ISAAC MURPHY,
Governor of Arkansas.

GEORGE W. M. REID, Esq.,
Clerk Circuit Court Washington County, Arkansas.

With reference to the measures adopted to suppress the proscriptive party spirit referred to, I have the honor to state, that United States troops have been stationed at various points in Arkansas; that, in a manner more particularly explained in a report that I have had the honor to make to his excellency the governor of the State, and which has been transmitted by him to the legislature, companies of militia have from time to time been organized, with the approval, in all cases, of the commander of the department of Arkansas, whose duty it is,

while not interfering with the process of civil law, to protect themselves against bad and lawless men.

In conclusion permit me also to add that no effort is spared by the executive of the State to allay by peaceful means the bitterness of feeling that still exists in some portions of the State, counselling forbearance by all, and especially to forget the attitude of each to the other during the late contest of arms.

I have the honor to be, very respectfully, your obedient servant,

A. W. BISHOP,
Adjutant General.

Hon. W. HICKS,
Chairman Senate Committee.

Hon. W. H. BROOKS,
*Chairman House Committee of the
General Assembly of the State of Arkansas.*

HEADQUARTERS, STATE OF ARKANSAS,
ADJUTANT GENERAL'S OFFICE,
Little Rock, December 7, 1866.

I certify that the foregoing are true copies of communications on file or of record in this office.

A. W. BISHOP,
Adjutant General of Arkansas.

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RIO GRANDE GRANT.

MEMORIAL

OF THE

LEGISLATURE OF NEW MEXICO,

RELATIVE TO

Rio Grande grant of lands.

JANUARY 7, 1867.—Referred to the Committee on Public Lands and ordered to be printed

OFFICE OF SECRETARY OF THE TERRITORY,
Santa Fé, New Mexico, December 20, 1866.

SIR: In compliance with the resolution of the council of the legislative assembly of this Territory, I have the honor to forward herewith a memorial in regard to the "Rio Grande land grant," and to request you to lay it before the honorable body over which you preside.

Please acknowledge the receipt of the enclosed.

I have the honor to be, very respectfully, your obedient servant,
W. F. M. ARNY,
Secretary and Acting Governor, New Mexico

Hon. SCHUYLER COLFAX,
Speaker of the House of Representatives.

To the honorable the Congress of the United States:

Your memorialists, the council of the legislative assembly of the Territory of New Mexico, would most respectfully represent, that we are informed that Brevet Brigadier General James H. Carleton, Brevet Colonel N. H. Davis, Brevet Lieutenant Colonel A. B. Carey, and others, have surreptitiously purchased from a few poor and ignorant persons in Taos county, New Mexico, an old Spanish grant, commonly called the "Rio Grande grant," which said persons are supposed to own, predicated upon a grant made over one hundred years ago; and that said officers have used their position in this country to obtain said grant for a sum less than two hundred dollars, and we are now informed are expecting to have your honorable body confirm said grant.

Your memorialists would further represent, that upon this grant there are now residing nearly three thousand persons, many of whom and their ancestors have lived upon this land for nearly one hundred years, and have improvements worth

several hundred thousand dollars. These settlers deem it a great hardship to be compelled to leave their old homes for the purpose of enriching a few speculators who were sent here by the government to protect them, and not to despoil them.

Your memorialists would, therefore, ask your honorable body to pass a law giving to the actual settlers who have occupied, improved, and lived upon the land for the last ten years a title to the land so occupied by them, and not confirm an old land grant, the conditions of which have not been complied with by any person except the present actual settlers; and your memorialists ask in behalf of these settlers protection; and, as in duty bound, they will ever pray.

MIGUEL E. PINO,

President of the Council.

• FRANCISCO SALAZAR,

Chief Clerk.

Resolved by the council of the legislative assembly of the Territory of New Mexico, That the honorable secretary of the Territory be required to forward a copy of the foregoing to the President of the Senate, the Speaker of the House of Representatives, to his Excellency the President of the United States, to the honorable Secretary of War, General U. S. Grant, and to our delegate in Congress.

MIGUEL E. PINO,

President of the Council.

FRANCISCO SALAZAR,

Chief Clerk.

UNITED STATES OF AMERICA, *Territory of New Mexico:*

I, W. F. M. Arny, secretary and acting governor of New Mexico, do hereby certify that the foregoing is a true copy of the original, passed *unanimously* by the council of the legislative assembly of this Territory, and on file in my office.

In testimony whereof, I have hereunto set my hand and official [SEAL.] seal this 19th day of December, 1866.

W. F. M. ARNY,

Secretary and Acting Governor, New Mexico.

MILITARY ROAD IN DAKOTA.

MEMORIAL

FROM

THE LEGISLATURE OF DAKOTA,

PRAYING

For the establishment of a military road from Elk Point to Sioux Falls, in Dakota Territory.

JANUARY 11, 1867.—Referred to the Committee on the Territories and ordered to be printed.

To the honorable the Senate and House of Representatives of the United States in Congress assembled :

Your memorialist, the legislative assembly of the Territory of Dakota, would most respectfully represent that Fort Dakota, a military post established at Sioux Falls, in the county of Minnehaha, and now garrisoned with troops, is situated about sixty miles north of Elk Point, the county site of Union county, on the Missouri river, at which point the military road leading to Fort Randall passes. Your memorialist would further represent that all the supplies for the garrison are transported by teams from the Missouri river, starting from Sioux City, and carried by way of Elk Point, above named, as that is the nearest point to said military post where supplies can be obtained; and your memorialist would further represent that to facilitate and cheapen the transportation to said post a road should be laid out and established from Elk Point up the Big Sioux River valley, to Fort Dakota, passing in a direct line through a section of country that will soon be settled with a class of pioneers who, in a few years, will relieve the government of the expense of a garrison at that point. Your memorialist would further represent that upon this proposed road there are but two prominent streams to be bridged, a few smaller ones also to be bridged, and some small sloughs to be graded. These improvements will require a small appropriation, and your memorialist most respectfully asks that your honorable bodies will grant a sum of ten thousand dollars for the purposes represented in this petition; and your memorialist will ever pray.

J. B. S. TODD, *Speaker.*

M. K. ARMSTRONG,

President of Council.

F. WIXSON,

Chief Clerk House of Representatives.

B. M. SMITH, *Secretary.*

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DRAINAGE THROUGH THE NAVY YARD AT CHARLESTOWN,
MASSACHUSETTS.

[To accompany bill H. R. No. 995.]

JANUARY 14, 1867.—Ordered to be printed.

Deed for the right of sewerage, &c.

Know all men by these presents, that I, Ebenezer Breed, of Charlestown, in the county of Middlesex, and Commonwealth of Massachusetts, tinman, in consideration of three thousand eight hundred and ninety-three dollars and ninety-two cents, paid by the United States of America, by their agent, Aaron Pitman, esq., of said Charlestown, the receipt whereof I do hereby acknowledge, do hereby give, grant, sell, and convey unto the said United States of America a certain lot or piece of land lying and being in Charlestown aforesaid, containing, by estimation, seven acres and thirty-six rods, being part of a certain lot called Dam Pasture, and is butted and bounded as follows, viz : beginning at the southerly corner of said pasture at a stake and stones, one rod south from the end of a ditch or dam wall at a corner of a lot lately belonging to David Stearns ; thence running northeasterly thirty-eight rods and one-half on said Stearns's lot, keeping one rod south of said dam or ditch wall to a stake and stones ; thence southerly twenty rods and one-half to the end of the rail fence on the beach, and so on to low-water mark ; again beginning at said first-mentioned stake and stones, bounded westerly on the road five rods and ten links ; thence northwesterly on the road five rods and ten links ; thence northwesterly on a straight line fifty-three rods on said Breed's land to a stake and stones in the wall on the proprietor's way, so called ; thence on said proprietor's way seven rods four links till it comes to a corner of land lately belonging to Catherine Henley ; from thence southerly forty rods eleven links on said Henley's land to the end of the rail fence on the beach, and so on to low-water mark ; thence westerly thirteen rods on said low-water mark to where the line is intersected by the second line above described : Provided, and it is an express condition, that a certain sluice, or drain, which leads the water from said Breed's land, shall be preserved and always kept in good repair by the said United States, and at their own proper expense ; and, also, that fences shall be erected and always kept in good repair on the line of division between the land hereby conveyed and the remaining part of said Dam Pasture at the expense of said United States ; the premises herein granted being for the accommodation of the United States in the establishment of a navy and dock yard, and to be improved for that purpose :

To have and to hold the afore-granted premises to the United States for the purpose aforesaid, to their use and behoof forever. And I do covenant with the said United States that I am lawfully seized in fee of the afore-granted premises ; that they are free from all incumbrances ; that I have good right to sell and convey the same to the said United States ; and that I will warrant and defend the same to the said United States forever against the lawful claims and demands of all persons, it being understood by the parties to these presents

that the United States, taking these premises, and also a certain lot called Moulton's or Charlestown Point lot, containing three acres and thirty-six rods, do relinquish all further claim to any other land of said Breed's, in said Charlestown, for the purpose aforesaid.

In witness whereof, I, the said Ebenezer, together with Mary Breed, my wife, in token of her relinquishment of dower in the premises, have hereunto set our hands and seals this 21st day of February, A. D. 1801.

EBENEZER BREED. [SEAL.]
MARY BREED. [SEAL.]

Signed, sealed, and delivered in presence of—

DAVID DEVINS,
HENRY MIRICK.

COMMONWEALTH OF MASSACHUSETTS,
Middlesex, February 24, 1801.

Then the within named Ebenezer Breed personally appeared and acknowledged this instrument, by him subscribed, to be his voluntary deed, before me.

JOSIAH BARTLETT,
Justice of the Peace.

MIDDLESEX, ss :

CAMBRIDGE, *March 12, 1801.*

Received and entered by Samuel Bartlett, register.

EMPLOYÉS OF THE HOUSE OF REPRESENTATIVES.

LETTER

FROM

THE CLERK OF THE HOUSE OF REPRESENTATIVES

RELATIVE TO

Appropriations for increased pay to certain employés of the House of Representatives.

JANUARY 14, 1867.—Referred to the Committee on Appropriations and ordered to be printed.

CLERK'S OFFICE, HOUSE OF REPRESENTATIVES,
Washington, D. C., January 12, 1867.

SIR: The House of Representatives during the last session, at various dates ranging from January 10, 1866, to July 27, 1866, passed sundry resolutions for the payment of additional sums of money to certain of its clerks and employés, as will appear from copies hereunto annexed.

On the 28th of July, 1866, a section was inserted in the civil bill, which was in these words:

"SEC. 18. *And be it further enacted*, That there be allowed and paid to the officers, clerks, committee clerks, messengers, and all other employés of the Senate and House of Representatives, and to the Globe and official reporters of each house, and the stenographer of the House, and to the Capitol police, and the three superintendents of the public gardens, their clerks and assistants, and to the librarian, assistant librarians, messengers, and other employés of the Congressional library, an addition of twenty per cent. on their present pay, to commence with the present Congress; and the amount necessary to pay this allowance is hereby appropriated out of any money in the treasury not otherwise appropriated."

In order to execute this law, it became necessary to have a construction placed upon it and upon the resolutions, the chief question being whether the twenty per cent. therein named was to be calculated upon the previous fixed rate of compensation, or upon that sum as increased in those specific cases by the resolutions of the House above referred to.

The subject was brought to the attention of the First Comptroller in a letter of which this is a copy:

CLERK'S OFFICE, HOUSE OF REPRESENTATIVES,
Washington, D. C., July 31, 1866.

SIR: The eighteenth section of the civil and miscellaneous appropriation bill, approved July 28, 1866, is in these words:

"SEC. 18. *And be it further enacted*, That there be allowed and paid to the

officers, clerks, committee clerks, messengers, and all other employés of the Senate and House of Representatives, and to the Globe and official reporters of each house, and the stenographer of the House, and to the Capitol police, and the three superintendents of the public gardens, their clerks and assistants, and to the librarian, assistant librarians, messengers, and other employés of the Congressional library, an addition of twenty per cent. on their present pay, to commence with the present Congress; and the amount necessary to pay the allowance is hereby appropriated out of any money in the treasury not otherwise appropriated."

In administering this act some questions arise, to which I ask your consideration.

At various times during the late session of Congress the House of Representatives passed resolutions upon the subject of compensation of certain of the officers and employés, of which copies are enclosed.

The act of July 28, 1866, makes the "present pay" the basis upon which the increase of 20 per cent. is to be calculated. Your opinion is respectfully requested—

1st. Whether the "present pay" of an officer or employé is that fixed by law before the passage of said resolutions, or whether the increase voted therein should be added to the previously existing rates, and the 20 per cent. increase be computed upon that sum?

2d. Whether the persons named or described in the resolutions of the House aforesaid are entitled to the sums respectively voted therein; and whether they are also entitled to the 20 per cent. voted in the act of July 28, 1866, and if so, at what date do the resolutions cease to operate and the act begin, or are they concurrent for the entire period?

3d. Supposing that payments have been made under any of said resolutions of the House, would you hold them to be good if not extending beyond the date of the act of July 28, 1866, and that from the latter date only the resolutions cease to have operation, as being superseded by the more general provisions of the act?

4th. Whether the 20 per cent. voted in the act is due to all who have been in the employ of the House since March 5, 1865, or only to those who were upon the rolls at the date of the act?

I am, sir, very respectfully, your obedient servant,

EDWARD MCPHERSON,

Clerk of the House of Representatives of the United States.

Hon. R. W. TAYLER,

First Comptroller of the Treasury.

The reply of the Comptroller was as follows:

TREASURY DEPARTMENT,

Washington, D. C., August 9, 1866.

SIR: I have considered the questions contained in your communication of the 31st ultimo, relative to the construction and application of the eighteenth section of the miscellaneous appropriation act, approved July 28, 1866, making an increase of 20 per cent. in the compensation allowed to officers, &c., of the House of Representatives.

Accompanying your letter I find sundry resolutions increasing or changing the rate of compensation of sundry clerks of committees, and of the House, &c., adopted during the late session; and the principal question presented by you is, in substance, whether the additional allowances made by these resolutions is to be added to the previous rate of compensation in order to ascertain "the present pay" of the officers, clerks, &c., upon which the computation of 20 per cent. is to be made, and to which it is to be added, or whether the eighteenth section above referred to is to be regarded as a substitute for, and as taking

the place of, the several resolutions of the House? Without entering into a detailed statement of the reasons which lead me to the conclusion, I answer:

1st. That the eighteenth section of the appropriation act superseded and took the place of the several resolutions referred to.

2d. That the increase relates back to and dates on and from the 5th of March, 1865.

3d. That every person described in the section, and serving for a portion of the period named, is entitled to the increase for the time during which he served, and no more, whether he was in service at the date of the act or had previously left it.

4th. If any one has been paid under a House resolution, the additional allowance thus paid should be deducted in making future payments. If such person has gone out of the service, so that no deduction can be made from future payments, the resolution may be regarded as a justification to the clerk for payments made prior to the passage of the act, provided there was an appropriation to pay it.

Under this construction you can readily ascertain the sum to be paid to each one by taking the compensation as it stood regulated or recognized at the commencement of the session, and adding to it twenty per cent.

In case any new clerkship was authorized during the session, the compensation fixed by the resolution authorizing or making the appointment will be the basis of compensation.

It is possible I have given a wrong construction to the act of Congress and the resolutions of the House; but it seems to me if a different construction were adopted, allowing the increase as proposed by the resolutions, and the twenty per cent. as allowed by the act, consequences would result not contemplated by Congress.

If I err in the opinions expressed, Congress will doubtless correct the error at the next session, which is not far off, and those interested will suffer but slight delay.

I am, very respectfully, your obedient servant,

R. W. TAYLER, *Comptroller.*

HON. EDWARD MCPHERSON,

Clerk of the House of Representatives.

This construction was accepted as binding upon this office, and payment was made in accordance therewith.

It will illustrate the Comptroller's view of the existing law on the subject of payments by the Clerk of the House, to subjoin another letter, of December 19, 1866, in reply to one covering two resolutions of July 27, 1866, respecting the payment of an additional clerk in the office of the Sergeant-at-arms, and the pay of temporary mail-boys during the recess of Congress:

TREASURY DEPARTMENT,

Washington, December 19, 1866.

SIR: Your communication of the 14th instant, with the accompanying resolutions of the House, has been received.

I suppose each house determines the number and character of its own employés; but, of course, no compensation can be paid them until an appropriation applicable to that purpose has been made.

The resolution turning the temporary clerkship in the office of the Sergeant-at-arms into a permanent one, and placing the clerk on the roll, is one that it was entirely competent for the House to pass; but by force of the resolution the clerkship ceases to be a contingency, and the salary is no longer payable from the contingent fund; *and no portion of the money appropriated for the pay of other officers and clerks can be used for the pay of this clerk.*

The resolution in relation to the retention of the three temporary mail-boys was also within the powers of the House; but it does not turn them into regular officers of the body. They still remain temporary mail-boys, though their service is continued beyond the period originally contemplated, and they can be paid from the appropriation "for pages and temporary mail-boys," *if that be sufficient.*

I am, very respectfully,

R. W. TAYLER, *Comptroller.*

Hon. EDWARD McPHERSON,

Clerk of the House of Representatives.

No appropriation of money having been made to carry out any of the resolutions—the attempt to do so having failed—the Comptroller's decision was a practical declaration of their invalidity; and, in lieu thereof, the twenty per cent. increase voted by the act of July 28, 1866, was, in accordance with his decision, paid to all the persons therein described.

The correspondence, the resolutions, and the propriety of further legislation upon the subject-matter are respectfully submitted to the judgment of the House.

I have the honor to be, your obedient servant,

EDWARD McPHERSON,

Clerk of the House of Representatives.

Hon. SCHUYLER COLFAX,

Speaker of the House of Representatives.

THIRTY-NINTH CONGRESS, FIRST SESSION.

CONGRESS OF THE UNITED STATES,

In the House of Representatives, January 10, 1866.

On motion of Mr. B. Van Horn,

Resolved, That the salary of O. S. Buxton, first assistant doorkeeper of this house for the thirty-ninth Congress, be made equal to that of the reading clerk.

Attest:

EDWARD McPHERSON, *Clerk.*

CONGRESS OF THE UNITED STATES,

In the House of Representatives, June 11, 1866.

On motion of Mr. S. J. Randall,

Resolved, That until further order, the pay of the reading clerk, assistant reader, and tally clerk be made equal to that of the journal clerk, to commence with the present fiscal year.

Attest:

EDWARD McPHERSON, *Clerk.*

CONGRESS OF THE UNITED STATES,

In the House of Representatives, June 18, 1866.

On motion of Mr. Morris,

Resolved, That the compensation of Edward Spicer, superintendent of the folding-room, be made equal to that now paid to the first assistant doorkeeper, and that the compensation of John Bailey, assistant disbursing clerk, be, and the same is hereby, increased and made the same as that of the journal clerk, beginning with the present Congress.

Attest:

EDWARD McPHERSON, *Clerk.*

CONGRESS OF THE UNITED STATES,
In the House of Representatives, June 18, 1866.

On motion of Mr. Holmes,

Resolved, That until further order, the salary of the chief clerk of this house be fixed at three thousand dollars per year, beginning with the present fiscal year.

Attest :

EDWARD McPHERSON, *Clerk*.

CONGRESS OF THE UNITED STATES,
In the House of Representatives, June 18, 1866.

On motion of Mr. Winfield,

Resolved, That until further ordered, the salary of the superintendent of the speech folding department and the book-keeper of the folding room, House of Representatives, shall be equal to that of the enrolling clerk of the House, to commence at the beginning of the present fiscal year.

Attest :

EDWARD McPHERSON, *Clerk*.

CONGRESS OF THE UNITED STATES,
In the House of Representatives, June 25, 1866.

On motion of Mr. Woodbridge,

Resolved, That the compensation of the file, printing, petition, stationery, and principal engrossing clerks, I. Strohm, A. J. Larner, and E. Cowan, be made equal to that of the assistant disbursing clerk, and that John M. Barclay, journal clerk, receive a like increase of compensation with that of said assistant disbursing clerk under the resolution of the House of the 18th instant; said increase of compensation to commence at the same time provided in said resolution: *Provided*, That the salaries of all officers of the House increased at the present session shall not extend beyond the first session of the next Congress.

Attest :

EDWARD McPHERSON, *Clerk*.

CONGRESS OF THE UNITED STATES,
In the House of Representatives, June 25, 1866.

On motion of Mr. Woodbridge,

Resolved, That until otherwise ordered the Clerk of the House of Representatives be directed to pay to all clerks and employés of the same, receiving salaries of twelve hundred dollars or less, a sum equal to twenty-five per cent. additional compensation upon the amounts received by said employés, to date from the commencement of the thirty-ninth Congress: *Provided*, That the extra twenty-five per cent. shall be paid only during the present Congress.

Attest :

EDWARD McPHERSON, *Clerk*.

CONGRESS OF THE UNITED STATES,
In the House of Representatives, June 25, 1866.

On motion of Mr. Kerr, from the Committee on Accounts,

Resolved, That the salary of the chief clerk in the office of the Sergeant-at-arms be the same as that of the assistant disbursing clerk of this house during the thirty-ninth Congress.

Attest :

EDWARD McPHERSON, *Clerk*.

CONGRESS OF THE UNITED STATES,
In the House of Representatives, July 16, 1866.

On motion of Mr. Cook,
Resolved, That the salaries of all officers and employés of the House increased at the present session shall not extend beyond the first day of the next Congress.
 Attest :

✱ EDWARD McPHERSON, *Clerk.*

CONGRESS OF THE UNITED STATES,
In the House of Representatives, July 16, 1866.

Mr. E. B. Washburne offered the following, which was adopted :
Resolved, That the several clerks to the committees of the House, whose pay has heretofore been four dollars per day, shall be paid at the rate of five dollars per day during this Congress for the time actually employed.
 Attest :

EDWARD McPHERSON, *Clerk.*

CONGRESS OF THE UNITED STATES,
In the House of Representatives, July 25, 1866.

On motion of Mr. Blaine,
Resolved, That the salary of Paul Stevens, librarian in charge of the hall library, be fixed at fifteen hundred dollars, beginning with the present Congress.
 Attest :

EDWARD McPHERSON, *Clerk.*

CONGRESS OF THE UNITED STATES,
In the House of Representatives, July 27, 1866.

On motion of Mr. Rollins, from the Committee on Accounts,
Resolved, That the temporary clerk in the office of the Sergeant-at-arms be placed upon the roll as a regular clerk in that office, at the compensation he now receives.
 Attest :

EDWARD McPHERSON, *Clerk.*

CONGRESS OF THE UNITED STATES,
In the House of Representatives, July 27, 1866.

On motion of Mr. Ingersoll,
Resolved, That the Postmaster of the House is hereby authorized to retain in employment the three temporary mail-boys during the vacation of Congress.
 Attest :

EDWARD McPHERSON, *Clerk.*

CONGRESS OF THE UNITED STATES,
In the House of Representatives, July 27, 1866.

On motion of Mr. Dawes,
Resolved, That there be paid out of the contingent fund to each of the reporters employed in reporting the proceedings of the House the present session, for the Congressional Globe, an amount equal to the annual increase of compensation allowed during the present session to the assistant disbursing clerk.
 Attest :

EDWARD McPHERSON, *Clerk.*

1791

At the end of the year

He was at the end of the year

1792

At the end of the year

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At the end of the year

1802

EMPLOYÉS OF THE HOUSE OF REPRESENTATIVES.

LETTER

FROM

THE CLERK OF THE HOUSE OF REPRESENTATIVES,

TRANSMITTING

*List of clerks and other persons employed in his department during the year
1866.*

JANUARY 17, 1867.—Laid on the table and ordered to be printed.

OFFICE OF THE HOUSE OF REPRESENTATIVES,

January 1, 1867.

SIR: In compliance with the eleventh section of the act entitled "An act legalizing and making appropriations for such necessary objects as have been usually included in the general appropriation bills without authority of law, and to fix and provide for certain incidental expenses of the departments of the government, and for other purposes," approved August 26, 1842, which requires the Clerk of the House of Representatives to report to Congress the names of the clerks and other persons employed in his office, I have the honor to submit the following statement, and to remark that the persons therein named have been usefully employed.

EDWARD MCPHERSON,
Clerk of the House of Representatives.

Hon. SCHUYLER COLFAX,
Speaker of the House of Representatives.

List of clerks and other persons employed in the House of Representatives.

Name.	Time employed.	Pay.
Clinton Lloyd	January 1 to December 31, 1866	\$2,592 00
John M. Barclay	do do	3,000 00
Terris Finch	do do	2,160 00
John Bailey	do do	2,160 00
Isaac Strohm	do do	2,160 00
William K. Mehaffey	do do	2,592 00
George W. Matthews	do do	2,160 00
Rd. U. Sherman	do do	2,592 00
Edward W. Barber	do do	2,160 00
James W. Clayton	do do	2,160 00
Thaddeus Stevens, jr.	January 1 to November 30, 1866	1,980 00
Elias McMellen	December 1 to December 31, 1866	180 00
John R. Briggs, jr	January 1 to December 31, 1866	2,160 00
Henry N. Cartee	do do	2,100 00
Ephraim Cowan	do do	1,830 00
Daniel B. Thompson	do do	2,160 00
Whitelaw Reid	January 1 to April 30, 1866	720 00
James Tisdale	January 1 to December 31, 1866	1,920 00
Samuel D. Leib	do do	2,102 40
John B. Clark, jr	do do	1,440 00
William S. Irwin	January 1 to August 31, 1866	840 00
Paul Stevens	January 1 to December 31, 1866	1,246 00
William Averill	do do	2,160 00
Andrew J. Larner	do do	2,160 00
Venerando Pulizzi	do do	2,160 00
Judson Holcomb	do do	1,800 00
Edward S. Dana	November 1 to December 31, 1866	300 00
Walter W. Chase	January 1 to December 31, 1866	1,440 00
Columbus Stebbins	do do	760 00
Samuel D. Lord	August 1 to November 30, 1866	480 00
Samuel G. Bugh	January 1 to December 31, 1866	1,440 00
James W. Nightingale	do do	1,440 00
Henry W. Morrison	do do	1,440 00
Henry M. Maguire	do do	1,440 00
William Dalton	January 1 to July 31, 1866	766 80
A. B. Farwell	August 1 to November 30, 1866	439 20
William P. Copeland	December 1 to December 31, 1866	111 60
J. Q. Thompson	February 1 to April 30, 1866	360 00
P. H. Reinhard	May 1 to November 30, 1866	840 00
Andrew J. Morey	January 1 to November 30, 1866	1,320 00
J. D. Forney	January 1 to December 31, 1866	1,800 00
James H. Knox	January 1 to July 31, 1866	840 00
J. S. Crawford	August 1 to November 30, 1866	480 00
William B. Turner	January 1 to December 31, 1866	1,440 00
H. S. Linker	do do	1,440 00
J. H. Barker	do do	876 00
C. P. Bundick	do do	876 00
William Hutcheson	do do	876 00
J. H. Garges	do do	876 00
S. A. Wilkins	do do	876 00
Hugh Lyon	December 18 to December 31, 1866	33 60
B. G. Wheeler	January 1 to June 30, 1866	1,080 00
Joseph Reese	January 1 to December 31, 1866	1,440 00
Alexander Bruce	do do	788 40
John V. Johnson	January 1 to August 31, 1866	522 18
Henry McKenzie	September 1 to December 31, 1866	266 22
William Twine	January 1 to December 31, 1866	788 40
Sandy Bruce, jr	April 1 to December 31, 1866	525 00
Aquilla Hall	January 1 to December 31, 1866	876 00
William H. Smith	do do	867 00
Aaron Russell	do do	822 00

CONTINGENT EXPENSES OF THE HOUSE OF REPRESENT-
ATIVES.

LETTER

FROM

THE CLERK OF THE HOUSE OF REPRESENTATIVES,

COMMUNICATING

His annual report of the contingent expenses of the House of Representatives.

JANUARY 17, 1867.—Laid on the table and ordered to be printed.

OFFICE OF THE HOUSE OF REPRESENTATIVES,
January 1, 1867.

SIR: In obedience to a resolution of the House of Representatives, passed March 4, 1842, which requires "that the Clerk shall deliver to the postmaster of the House such kind and quantities of stationery as from time to time may be necessary for the use of the House, keeping an accurate account of the same, and also of the quantity and value of that used in the Clerk's office; and that hereafter, in the annual reports now required by law to be made by the Clerk, showing the amount of expenditure from the contingent fund of the House, he be required to state, accurately and distinctly, the quantity and cost of the stationery used by the House and the Clerk's office separately;" and also, in obedience to the second section of the act entitled "An act legalizing and making appropriations for such necessary objects as have been usually included in the general appropriation bills without the authority of law, and to fix and provide for certain incidental expenses of the departments and officers of the government, and for other purposes," approved August 26, 1842, which requires that the Clerk of the House of Representatives report to the House a detailed statement of the manner in which the contingent fund of the House has been expended, giving the name of every person to whom any portion thereof has been paid; and if for anything furnished, the quantity and price; and if for services rendered, the nature of such service and the time employed, and the particular occasion or cause, in brief, that rendered such service necessary; and the amount of all former appropriations in each case on hand, either in the treasury or in the hands of any disbursing officer or agent—I have the honor to make the following report, contained in papers marked A, B, C, and D.

Respectfully,

EDWARD MCPHERSON,

Clerk of the House of Representatives of the United States.

HON. SCHUYLER COLFAX,

Speaker of the House of Representatives, U. S.

CONTINGENT EXPENSES OF

A.—Detailed statement of disbursements, January 1, 1867.

To whom paid.	For what object.	Amount.	Total.
Thomas P. Bell.....	Furniture laborer, pay-roll for December, 1865	\$9 00	\$27 00
Lewis Cartwright.....	do.....do.....	6 00	112 00
Henry Hall.....	do.....do.....	6 00	112 00
John W. Lee.....	do.....do.....	6 00	112 00
William H. McCartney.....	Clerk to Committee on Naval Affairs, from December 4 to 31, 1865 .....	.....	88 04
E. G. Bowdoin.....	Clerk to Judiciary Committee, from December 4 to 31, 1865.....	.....	80 00
J. T. Williams.....	Clerk to Committee on Indian Affairs, from December 4 to 31, 1865 .....	.....	72 00
W. L. Wood.....	Clerk to Committee on the Public Lands, from December 14 to 31, 1865 .....	.....	230 00
John L. Swift.....	Clerk to Committee on Foreign Affairs, from December 11 to 31, 1865.....	.....	90 00
R. C. Walker.....	Clerk to Committee on War Debts of Loyal States, from December 14 to 31, 1865 .....	.....	56 30
Thomas A. Beaton.....	Use of 4 horses and carryalls, from December 9 to 31, 1865.....	.....	49 70
William K. Mehaffy.....	Reading clerk, House of Representatives, from October 1 to December 31, 1865 .....	.....	.....
A. W. Mann.....	Twenty per cent. additional salary, from December 7, 1863, to February 28, 1864 .....	.....	.....
Kitty Bruce.....	Washing 99½ dozen towels, in December, 1865.....	15 00	.....
Ira Goodnow.....	300 Metropolitan railroad tickets	15 00	.....
.....	300 Washington and Georgetown railroad tickets.....	.....	30 00
Campbell & Sons.....	1 truck for post office .....	.....	10 00
Joseph Mansfield.....	Twenty per cent. additional salary .....	.....	7 20
William Twine.....	Washing 9½ dozen towels.....	.....	4 83
William H. Randall.....	Newspapers, 1st session 39th Congress.....	.....	50 00
F. C. Beaman.....	do.....do.....	.....	50 00
Charles Upson.....	do.....do.....	.....	50 00
John R. Kelso.....	do.....do.....	.....	50 00
George F. Miller.....	do.....do.....	.....	40 00
J. W. Forney.....	Furnishing copies of Philadelphia Press to G. W. Scofield, 3 months, 2d session 38th Congress.....	2 25	.....
.....	Do.....do.....W. D. Kelley.....do.....	2 25	.....
Philp & Solomons.....	2½ dozen barometer inkstands and racks	56 00	4 50
.....	1½ do.....do.....do.....	14 00	.....
.....	1 ream extra heavy letter paper, ruled to order.....	9 00	.....
.....	6 diaries, No. 69.....	11 52	.....
.....	6 diaries, No. 80.....	11 52	.....

6 diaries, No. 95.....	10 38
6 diaries, No. 66.....	10 20
6 diaries, No. 25.....	8 22
6 diaries, No. 127.....	8 34
12 diaries, No. 46.....	18 24
12 diaries, No. 274.....	19 20
6 diaries, No. 143.....	7 80
6 diaries, No. 6.....	4 20
5 dozen French pen racks.....	45 00
2 dozen ivory folders.....	22 00
39,000 envelopes, 5½ by 3¾, C.....	190 32
14,000 envelopes, 8¾ by 3¾, K.....	89 60
10,000 envelopes, 10 by 12.....	109 70
6 dozen flat glass inkstands.....	36 00
1 quart French copying ink.....	2 25
2.....do.....do.....	4 50
10 pints French copying ink.....	13 75
36 boxes quill pens.....	36 00
8 rubber pen and pencil cases.....	54 00
4.....do.....do.....	37 80
45,500 white envelopes, 5½ by 3¾.....	222 04
1 dozen inkstands.....	3 60
23 autograph books.....	48 99
1 ream pocket note, cut to size, and ruled to pattern.....	8 00
12 inkstands.....	29 40
7½ dozen penholders, No. 21.....	10 10
2 dozen penholders, No. 3.....	34 64
2 dozen penholders, No. 4.....	34 64
2 pocket-books and memorandums, to order.....	9 50
4 dozen erasers.....	24 00
Add error on envelopes.....	19 90
1,274 35	
Phi'p & Solomons.....	10 00
2 dozen packs visiting cards.....	150 00
15,000 envelopes.....	40 00
5,000 envelopes.....	12 00
3 Lanman's Dictionary of Congress.....	3 00
1 blank book, indexed.....	36 00
4 reams legal cap.....	1 50
3 pairs shears.....	11 00
2 English penknives.....	12 00
2.....do.....	

A.—Detailed statement of disbursements, &c.—Continued.

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
Philp & Solomons—Contin'd .	1 gutta-percha pencil.....	\$4 00	
	2 reams extra heavy letter, ruled.....	17 00	
	$\frac{1}{2}$ ream note, ruled and stamped.....	3 50	
	2 reams extra heavy note.....	12 00	
	500 extra envelopes.....	3 75	
	10 reams demy, ruled to pattern and cut to size.....	120 00	
			\$471 75
J. F. Gedney	Heading engraved on 10 reams of paper for post office.....	36 00	
	4 reams commutation, N. and M.....	14 40	
	5 reams note paper.....	20 00	
	Ruling 10 reams.....	6 00	
			76 40
Evening Bulletin, Philadelphia	Advertising proposals for stationery.....		59 20
M. W. Galt & Brother	Engine clock.....		125 00
W. B. Moses	1 sofa.....		60 00
D. K. & S. D. Large.....	1 office desk.....		51 50
W. B. Matchet	Clerk to Committee on Invalid Pensions, from December 4 to 31, 1865.....	112 00	
	Do.....do..... January 1 to 10, 1866.....	40 00	
			152 00
Edwin Stevens	Clerk to Committee for the District of Columbia, from December 4 to 31, 1865.....		112 00
Clinton Lloyd	3 horses and wagons for office House of Representatives, in December, 1865.....		232 50
George Prince	Folder, pay-roll for December, 1865.....	16 95	
William H. Shoms.....	do.....do.....	19 81	
Edward Wilson.....	do.....do.....	1 00	
William Nash	do.....do.....	11 22	
William Dulin	do.....do.....	10 70	
Charles H. Bryan.....	do.....do.....	13 07	
John Jones.....	do.....do.....	9 35	
Thomas Sheets	do.....do.....	9 15	
John Knarb.....	do.....do.....	10 40	
			101 65
William H. Harding.....	Advertising in Philadelphia Inquirer proposals for paper and twine.....		24 50
William M. Ellis & Brother ..	Labor on feed-pipe and boiler.....	10 00	
	1 dozen $\frac{3}{8}$ screws.....	38	
			10 38

Fitzgerald & Co.....	Advertising fuel.....	.....	5 75
M. F. Benzane.....	Compensation as claimant for a seat in the House of Representatives from Louisiana, 38th Congress.....	.....	2,000 00
A. A. C. Rogers.....	Compensation as claimant for a seat in the House of Representatives from Arkansas, 38th Congress.....	.....	2,000 00
S. J. Bowen.....	Excess of postage on letters and packages addressed to members of the House.....	.....	59 00
William H. Merriam.....	2 copies Journal Secession Convention of Virginia.....	.....	50 00
Thomas Henson.....	Materials for whitewashing.....	3 00	
	7 day's work.....	17 50	
Ralph Hill.....	Newspapers, 1st session 39th Congress.....	.....	20 50
Thomas M. Stillwell.....	Newspapers, 1st session 39th Congress.....	.....	50 00
William E. Finck.....	Newspapers, 1st session 39th Congress.....	.....	50 00
Fitzgerald & Co.....	Advertising stationery.....	.....	40 00
Thomas A. Beaton.....	Hauling 417 loads of documents from December 9 to 31, 1865.....	.....	40 50
U. H. Painter.....	Clerk to Committee on the Post Office and Post Roads, from December 4 to 31, 1865.....	.....	208 50
Charles Dean.....	1,236 pounds twine.....	370 80	
	4½ pounds twine.....	1 35	
John H. Hersey.....	Messenger in post office, from December 5 to 18, 1865.....	.....	372 15
William P. Anderson.....	Messenger in post office, from December 5 to 18, 1865.....	.....	56 00
T. T. Fowler & Co.....	6,955 pounds ice, December, 1865.....	.....	56 00
Samuel D. Leib.....	6 copies McPherson's Political History.....	.....	26 08
J. D. Duncan.....	2 copies of Mitchell's New General Atlas for Committees on Indian Affairs and the Public Lands.....	.....	30 00
Lewis Saunders.....	Cleaning mace three times.....	.....	20 00
F. & J. Rives.....	5 copies Daily Globe, 1st session 39th Congress, for W. D. McIndoe.....	.....	9 00
Charles Goodyear.....	Newspapers, 1st session 39th Congress.....	.....	50 00
Samuel J. Randall.....	Newspapers, 1st session 39th Congress.....	.....	50 00
Delos R. Ashley.....	Newspapers, 1st session 39th Congress.....	.....	50 00
T. A. Plants.....	Newspapers, 1st session 39th Congress.....	.....	50 00
Ticknor & Fields.....	"Atlantic" for G. W. Julian, 1st session 39th Congress.....	.....	44 00
Daniel W. Voorhees.....	Stationery, 1st session 39th Congress.....	.....	4 00
William P. Copeland.....	Services in post office, House of Representatives, from January 1 to 15, 1866.....	.....	63 52
F. & J. Rives.....	36 complete sets, 68 volumes each, of the Congressional Globe and Appendix, from the 23d to 38th Congress, 2,040 volumes.....	.....	37 17
Robert J. Stevens.....	Clerk to Committee on Appropriations, from January 1 to 31, 1866.....	.....	10,200 00
John B. Clark, jr.....	Cartage of 155 loads of books, documents, and boxes to departments, express offices, and railroad depots.....	.....	180 00
William Averill.....	Temporary clerk, pay-roll for January, 1866.....	.....	77 50
A. J. Larnier.....	do.....	150 00	
V. Pulizzi.....	do.....	150 00	
	do.....	150 00	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. Holcomb	Temporary clerk, pay-roll for January, 1866.....	\$125 00	\$800 00
E. Cowan.....	do.....	125 00	236 09
W. W. Chase.....	do.....	100 00	186 00
E. S. Chapman.....	Clerk to Committee on the Territories, from December 4, 1865, to January 31, 1866.....		52 00
V. E. Smalley.....	Clerk to Committee on Military Affairs, from January 1 to 31, 1866.....		124 00
J. A. McKean.....	Clerk to Committee on Commerce, from December 19 to 31, 1865.....		124 00
D. W. Bartlett.....	Clerk to Committee of Elections, January, 1866.....		124 00
Edwin Stevens.....	Clerk to Committee for the District of Columbia, January, 1866.....		124 00
E. G. Bowdoin.....	Clerk to Committee on the Judiciary, January 1866.....		124 00
S. D. Lord.....	Clerk to Committee on Accounts, January, 1866.....		124 00
W. H. McCartney.....	Clerk to Committee on Naval Affairs, January, 1866.....		124 00
J. L. Swift.....	Clerk to Committee on Foreign Affairs, January, 1866.....		124 00
J. T. Williams.....	Clerk to Committee on Indian Affairs, January, 1866.....		124 00
R. C. Walker.....	Clerk to Select Committee on War Debts of Loyal States, January, 1866.....		124 00
A. S. Perham.....	Clerk to Committee on Invalid Pensions, from January 11 to 31, 1866.....		84 00
H. F. Baker.....	Clerk to Committee on the Militia, from January 11 to 31, 1866.....		84 00
Ezra Doval.....	Clerk to Committee on Freedmen, from December 14 to 31, 1865.....		72 00
J. A. McKean.....	Clerk to Committee on Commerce, January, 1866.....		124 00
J. S. Lee.....	Folder, pay-roll for January, 1866.....	100 00	
Theodore Blague.....	do.....	100 00	
J. T. Chauncy.....	do.....	100 00	
Junius Simons.....	do.....	100 00	
John Sterling.....	do.....	100 00	
J. M. Shome.....	do.....	93 00	
G. W. Nokes.....	do.....	93 00	
A. H. Walcott.....	do.....	93 00	
Benjamin Ross.....	do.....	93 00	
William Cunningham.....	do.....	93 00	
F. W. Vaughn.....	do.....	93 00	
Edward Tuck.....	do.....	93 00	
John Dyer.....	do.....	93 00	
Oliver Peabody.....	do.....	93 00	
Lawrence Biss.....	do.....	93 00	

Joseph Whitcomb.....	do.....	do.....	93 00
J. H. Hamilton.....	do.....	do.....	93 00
S. D. Hills.....	do.....	do.....	93 00
C. W. Linthurst.....	do.....	do.....	93 00
D. C. Lewis.....	do.....	do.....	93 00
S. S. Strachan.....	do.....	do.....	93 00
H. C. Nagle.....	do.....	do.....	93 00
Briggs Thomas.....	do.....	do.....	93 00
M. Kellinger.....	do.....	do.....	93 00
Frederick Irvin.....	do.....	do.....	93 00
H. P. Lantz.....	do.....	do.....	93 00
L. D. Lanier.....	do.....	do.....	93 00
B. D. Peck.....	do.....	do.....	93 00
J. W. Pettit.....	do.....	do.....	93 00
Franklin Mace.....	do.....	do.....	87 00
William Small.....	do.....	do.....	93 00
J. W. Pope.....	do.....	do.....	93 00
W. H. Boughter.....	do.....	do.....	93 00
T. P. Drew.....	do.....	do.....	93 00
H. W. McGeuge.....	do.....	do.....	93 00
J. L. McKie.....	do.....	do.....	93 00
H. L. Bonsall.....	do.....	do.....	93 00
W. S. Young.....	do.....	do.....	93 00
H. C. Sherrill.....	do.....	do.....	93 00
W. R. Smith.....	do.....	do.....	93 00
William Davis.....	do.....	do.....	93 00
W. G. Brown.....	do.....	do.....	93 00
C. H. Coryell.....	do.....	do.....	51 00
R. I. Bennett.....	do.....	do.....	93 00
Samuel Ten Eyck.....	do.....	do.....	72 00
E. P. Farris.....	do.....	do.....	69 00
Marion Linville.....	do.....	do.....	63 00
C. H. Woods.....	do.....	do.....	30 00
Harrison Weaver.....	do.....	do.....	77 50
Julius De Sauls.....	do.....	do.....	77 50
Philip Nolan.....	do.....	do.....	55 80
Robert Dunmore.....	do.....	do.....	55 80
F. D. Curtis.....	do.....	do.....	93 00
Columbus Stebbins.....	Folder, pay-roll for January, 1866 ..	.....	100 00
A. J. Morey.....	do.....	do.....	100 00
			4,672 60

A.—Detailed statement of disbursements, &c.—Continued.

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
S. G. Bugh	Folder, pay-roll for January, 1866.	\$100 00	
J. W. Nightingale	do	100 00	
H. W. Morrison	do	100 00	
H. M. Maguire	do	100 00	
Paul Stevens	do	93 00	
William Dalton	do	93 00	\$786 00
W. R. Smith	Folder, pay-roll for December, 1865	51 00	
P. B. Prince	do	56 00	
Frank Fuller	do	42 00	
Austin Gardner	do	52 00	
Hiram Baldwin	do	50 00	
C. T. Rowe	do	48 00	
C. T. Choate	do	54 00	
Edward Tucker	do	84 00	437 00
A. H. Young	Folder, pay-roll for January, 1866	27 00	
G. M. Holmes	do	39 00	
Samuel Irick	do	37 50	
T. J. O'Connor	do	37 50	141 00
Mrs. Stillman Moores	62 buckets of paste, in January, 1866		93 00
J. D. Forney	Engineer, pay-roll for January, 1866	125 00	
J. H. Knox	do	100 00	
W. B. Turner	do	100 00	
H. S. Linker	do	100 00	
J. H. Barker	do	62 00	
C. P. Burdick	do	62 00	
William Hutchison	do	62 00	
J. H. Garges	do	62 00	
S. A. Wilkins	do	62 00	735 00
Clinton Lloyd	Use of 3 horses and wagons for office House of Representatives, January, 1866		232 50
Ira Goodnow	Use of horse and wagon, January, 1866	77 50	
	Use of saddle horse	62 00	139 50

A.—Detailed statement of disbursements, &c.—Continued.

By whom paid.	For what object.	Amount.	Total.
J. B. Hunt—Continued	Putting on 16 bolts	\$4 00	
	Drawer	2 50	
	3 locks	1 50	
	Repairing 3 chairs	2 00	
	Fire screen and shelf (Committee on Appropriations)	4 50	
	Case of pigeon holes, Clerk's office	18 00	
	Putting in new floor, stalls, trough, &c., in stable, folding-room	68 84	
	Table	5 00	
	Shelves	3 00	
	Repairing window, Clerk's office	75	
	1 extra size box	5 00	
	1 extra size box	5 00	
	Wood box (Committee on Naval Affairs)	8 00	
	Table (post office)	7 00	
	Repairing window cornice	75	
	Wood-hod (Clerk's office)	2 00	
	24 walnut hat-pins	1 92	
	Repairing dumb-waiter	8 32	
	Shelving book-case (folding-room)	4 25	
	Large pair folding doors, lock, latch, and bolts	28 50	
	1 lock (hall House of Representatives)	1 00	
	New top to table and repairing same (post office)	3 00	
	Repairing drawers (Committee on Commerce)	2 50	
	Repairing drawers (post office)	4 00	
	2 inclined ways	4 00	
	Putting fastenings on windows	1 00	
	Altering case (Committee on the Post Office and Post Roads)	4 50	
	Taking down and moving case	4 00	
	Repairing 2 hat-stands	1 00	
	Hat-hooks (Committee on Accounts)	75	
	Altering table and putting drawers in same	9 50	
	Towel-stand (bath-room)	2 00	
	Top on table (folding-room)	3 00	
	50 Congressional Globe boxes	175 00	

A. H. Morrison.....	77,000 envelopes.....	539 00	\$1,106 13
	24½ reams blotting paper.....	41 60	
F. H. Smith.....	Salary as stenographer, January, 1866.....	.....	580 60
J. D. Duncan.....	10 copies Mitchell's New Atlas.....	.....	310 00
William Simmons.....	Bricklayer and laborer, 5½ days.....	33 00	100 00
	¼ barrel cement.....	1 50	
	150 bricks.....	2 25	
	Bricklayer and laborer, 1 day.....	6 00	
	1 barrel mortar.....	50	
	75 bricks.....	1 12	
	Bricklayer and laborer, 7 days.....	42 00	
	5 feet tile.....	7 50	
	¼ barrel cement.....	1 50	
Mrs. J. D. Ward.....	Services as watch, and making fires in furnaces under folding-room, January, 1866.....	.....	95 37
Kitty Bruce.....	Washing 163½ dozen towels, January, 1866.....	.....	93 00
John Wahl.....	Repairing 1 Willard clock, (engine-room).....	2 00	81 75
	Repairing 1 French clock, (room 55).....	5 00	
	Repairing 2 clocks, (room 57 and Claims' Committee room).....	10 00	
	Repairing 1 clock, (Doorkeeper's department).....	1 50	
George W. Nokes.....	Lettering door of room of Committee on Banking and Currency.....	5 00	18 50
	Do.....Committee on Mileage.....	5 00	
	Do.....official reporters.....	5 00	
	Do.....Committee on Appropriations.....	5 00	
J. D. Duncan.....	1 copy Mitchell's New Atlas.....	.....	20 00
William Twine.....	Washing 13½ dozen towels, January, 1866.....	.....	10 00
Sibley & Gray.....	1 coal scuttle.....	.....	6 83
W. B. Atkinson.....	Page, pay-roll for January, 1866.....	62 00	2 25
William Chapline.....	do.....do.....	62 00	
P. N. Devitt.....	do.....do.....	62 00	
J. R. Davis.....	do.....do.....	62 00	
Joseph Dyas.....	do.....do.....	62 00	
William Hill.....	do.....do.....	62 00	
Walter Lauston.....	do.....do.....	62 00	
F. W. Larner.....	do.....do.....	62 00	
Edward Merritt.....	do.....do.....	62 00	
J. B. Moses.....	do.....do.....	62 00	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
W. E. Newman	Page, pay-roll for January, 1866.....	\$62 00	
S. H. Nealy	do.....do.....	62 00	
John Ogle.....	do.....do.....	62 00	
A. S. Pillsbury.....	do.....do.....	62 00	
W. C. Raymond.....	do.....do.....	62 00	
Theodore Slater.....	do.....do.....	62 00	
Henry Stewart.....	do.....do.....	62 00	
R. E. Stevens.....	do.....do.....	62 00	
H. C. Wall	do.....do.....	62 00	
E. H. Willard.....	do.....do.....	62 00	\$1,240 00
C. G. Burlingame.....	Riding page, pay-roll for January, 1866.....	62 00	
Frederick James.....	do.....do.....	62 00	
C. H. Wade.....	do.....do.....	62 00	
Walter Burr.....	Temporary mail-boy, January, 1866.....	75 00	186 00
W. S. Van Kueren.....	do.....do.....	75 00	
C. E. T. Bailey.....	Page, office House of Representatives, January, 1866.....	.....	150 00
L. H. Schneider.....	6 night-locks.....	10 50	62 00
	3 dozen blank keys.....	7 50	
	5 padlocks and fixtures.....	7 50	
	1 padlock, hasp and staple.....	2 40	
	2 dozen mitre knobs to order.....	15 00	
	1 bow lock, 2 dozen screws.....	4 50	
	1 dozen coat and hat hooks.....	2 00	
	2 dozen casters.....	8 00	
	1 dozen Polant's latch key.....	2 50	
	2 brass padlocks.....	2 00	
	4 staples and chain.....	40	
	Repairing eyelet punch.....	75	
	Repairing desk latch key.....	75	
	2 cylinder night-latches.....	4 50	
	Set steel letters and figures.....	12 50	

1 washer cutter.....	2 25
5 feet sheet brass.....	5 00
1 monkey-wrench.....	3 50
1 hand hammer.....	2 50
1 handsaw.....	4 25
3 assorted files, 1 hatchet.....	3 50
1 closet lock.....	2 50
1 tumbler lock.....	2 75
1 tumbler padlock.....	2 15
1 cylinder latch, (night).....	2 25
2 padlocks.....	3 50
4 bolts.....	1 00
2 cast-steel hammers.....	2 50
2 1/4 feet engine packing.....	32 63
1 dozen assorted files.....	7 75
1 dozen window fastenings.....	75
1 dozen papers assorted tacks.....	2 00
1 gross carpet tacks.....	15 25
1/2 dozen sail needles.....	50
1 lock and key.....	2 75
1 night-latch and key.....	2 00
2 pounds beeswax.....	1 70
7 night-latches.....	9 94
1 dozen blank keys.....	2 50
4 sets casters.....	6 00
1 gross screws.....	43
1/2 dozen brass keys.....	75
18 sets brass casters.....	18 00
9 gross screws.....	10 22
6 screw-driver handles.....	50
2 dozen papers 22-ounce tacks.....	2 75
1 pound chalk.....	10
2 hammers.....	2 75
16 dozen papers tacks, assorted.....	40 00
1/2 dozen packing needles.....	30
3 porcelain door-pulls.....	6 00
2 pounds beeswax.....	2 00
1 lock and latch.....	75
9 gross screws.....	6 45
2 brad-awls.....	10
4 dozen hooks and eyes.....	3 00

A.—Detailed statement of disbursements, &c—Continued.

To whom paid.	For what object.	Amount.	Total.
L. H. Schneider—Continued...	3 handles	\$0 30	
	Brace and bits.....	4 50	
	1 hack saw.....	2 00	
	1 set Aiken's tools.....	1 75	
	$\frac{1}{2}$ dozen brad-awls	18	
	1 dozen gimlets.....	88	
	3 assorted gauges.....	1 00	
	7 assorted chisels.....	2 70	
	2 assorted file and chisel handles.....	2 00	
	1 dozen files.....	4 35	
	1 panel saw.....	2 75	
	1 mallet.....	50	
	1 $\frac{1}{2}$ pound escutcheon pins.....	1 37	
	Set casters	1 25	
	2 papers gimp nails.....	60	
	2 dozen irons for desks.....	6 00	
	3 papers gimp tacks.....	90	
	4 gross screws.....	3 10	
	3 papers gimp tacks.....	1 25	
	1 dozen door-knobs.....	10 50	
	1 dozen hooks and eyes.....	3 50	
	1 dozen night-latches.....	17 00	
	6 dozen blanks	13 50	
	6 dozen cabinet blanks	4 50	
	6 gross assorted screws.....	3 00	
	3 sets casters.....	3 75	
	2 dozen door-bolts	9 00	
	1 door-lock.....	5 50	
	1 dozen porcelain door-pulls.....	2 00	
	$\frac{1}{2}$ dozen brass hooks.....	3 75	
	1 dozen porcelain knobs.....	1 10	
	1 hand-vice.....	1 25	
	$\frac{1}{2}$ dozen blank keys.....	1 25	
	5 extra drawer locks.....	11 25	

1 small screw-wrench	1 75	
12 hat-hooks	2 50	
1 gross screws	60	
11 window-shade fixtures	3 30	
1 dozen blank keys	1 15	
1 dozen blank keys	2 00	
1 1/2 dozen awls	1 12	
1/2 dozen awl handles	44	
16 feet small chain	30	
1 dozen hat-hooks	63	
1 sash lock	85	
6 night blanks	13 50	
1 dozen brass hooks and staples	18 00	
2-3 drawer locks	2 75	
3 drawer locks	6 50	
1 door lock	2 00	
2 1/2 dozen key rings	1 25	
6 dozen night-latch blanks	12 00	
1 case lock	1 75	
2 drawer locks	3 37	
1 dozen brass hooks	75	
2 sets casters	1 68	
2 sets sofa casters	2 50	
2 yards iron chain	40	
2 drawer locks	1 60	
Furniture pay-roll, January, 1866	150 00	\$510 04
do do do	100 00	
Clerk to Committee on Appropriations, February, 1866		250 00
Folder, pay-roll		180 00
do	2 30	
do	11 50	
do	4 90	
do	10 87	
do	5 95	
do	3 00	
do	16 70	
do	19 40	
do	27 67	
do	9 40	
do	32 19	
B. G. Wheeler		
Joseph Reese		
R. J. Stevens		
A. McH. Brown		
Nelson Carr		
George Mackey		
Edward Wilson		
Charles Wincher		
R. B. Gettings		
Thomas Sheets		
Henry Phillips		
George Prince		
Oscar Hughley		
W. H. Shome		

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. L. Sikken	Folder, pay-roll	\$11 70	
C. H. Bryan	do	19 56	
John Lambert	do	9 35	
William Nash	do	16 75	
George Sprague	do	2 70	
John Jones	do	11 18	
John Harris	do	13 25	
William Dulin	do	14 18	
John Daley	do	3 40	
John Knarb	do	18 98	
Francis White	do	10 88	
G. W. Cliff	do	13 52	
Elick Huff	do	7 80	
John Burdim	do	8 45	
Franklin Fuller	do	4 50	
Aaron Bradshaw	do	5 40	
William Sangston	do	10 00	
William Tabler	do	14 28	
Dennis Killafail	do	9 15	
John Mockabee	do	3 50	
W. S. Sterling	do	5 20	
C. F. Roe	do	1 00	
C. A. Lockrey	do	2 90	
Ulysses Stoddard	do	2 25	
William Summerville	do	4 40	
			\$368 16
E. McConnell	Folder, pay-roll for January, 1866	62 00	
Seg't Stelle	do	48 00	
Richard Meade	do	24 00	
			134 00
S. D. Lord	Folding documents, March 5 to 31, 1865, 26 days	87 10	
	Folding documents, April, 1865	100 00	
			187 10
U. H. Painter	Clerk to Committee on the Post Office and Post Roads, January, 1866	124 00	

William Averill.....	Temporary clerk, pay-roll for February, 1866.....	150 00	800 00
A. J. Larnier.....	do.....	150 00	168 00
V. Pulizzi.....	do.....	150 00	236 00
Judson Holcomb.....	do.....	125 00	112 00
Ephraim Cowan.....	do.....	125 00	112 00
W. W. Chase.....	do.....	100 00	112 00
V. E. Smalley.....	Clerk to Committee on Military Affairs, February, 1866.....		112 00
Ezra Davol.....	Clerk to Committee on Freedmen's Affairs, January and February, 1866.....		112 00
A. S. Perham.....	Clerk to Committee on Invalid Pensions, February, 1866.....		112 00
J. T. Williams.....	Clerk to Committee on Indian Affairs, February, 1866.....		112 00
John L. Swift.....	Clerk to Committee on Foreign Affairs, February, 1866.....		112 00
W. H. McCartney.....	Clerk to Committee on Naval Affairs, February, 1866.....		112 00
R. C. Walker.....	Clerk to Committee on War Debts of Loyal States, February, 1866.....		112 00
E. Stevens.....	Clerk to Committee for the District of Columbia, February, 1866.....		112 00
D. W. Bartlett.....	Clerk to Committee of Elections, February, 1866.....		112 00
E. S. Chapman.....	Clerk to Committee on the Territories, February, 1866.....		112 00
E. G. Bowdoin.....	Clerk to Committee on the Judiciary, February, 1866.....		112 00
John B. Clark, jr.....	Cartage of 140 loads of books, documents, and boxes to departments and express offices.....		70 00
Thomas A. Beaton.....	4 horses and carryalls for carrying mail, for the month of January, 1866.....		310 00
Clinton Lloyd.....	3 horses and carryalls for use of Clerk's office, February, 1866.....		210 00
John T. Johnson.....	Laborer, pay-roll for February, 1866.....	50 40	
Lewis Saunders.....	do.....	50 40	
Alfred Dade.....	do.....	50 40	
Robert Watkins.....	do.....	50 40	
Henry Hall.....	do.....	50 40	
T. B. Bell.....	do.....	50 40	
J. W. Lee.....	do.....	50 40	
Lewis Cartwright.....	do.....	50 40	
W. A. Duckett.....	do.....	50 40	
Alexander Bruce.....	do.....	50 40	
John V. Johnson.....	do.....	50 40	
William Twine.....	do.....	50 40	
Aaron Russell.....	do.....	50 40	
W. H. Smith.....	do.....	56 00	
Aquilla Hall.....	do.....	56 00	
Francis H. Smith.....	Stenographer, February, 1866.....	767 20	
J. W. Carson.....	Additional messenger, House post office, December 5, 1865, to February 5, 1866.....	280 00	
W. E. Dean.....	Additional messenger, House post office, December 20, 1865, to February 20, 1866.....	150 00	
Mrs. J. D. Ward.....	Services as watcher and keeping fires in the furnaces under the folding-rooms, February, 1866.....	150 00	
		84 00	

A.—Detailed statement of disbursements, &c.—Continued.

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
Kitty Bruce	Washing 173 dozen towels in February, 1866.....	.....	\$86 50
Clinton Lloyd.....	Freight paid on chair from Philadelphia.....	\$1 00	
	Freight paid on desk from Philadelphia.....	1 26	
	Hauling tables from depot.....	4 00	
	Hauling desk and freight.....	1 64	
	Do.....do.....	3 28	
	Express charges on clock.....	75	
	Telegram for Military Committee.....	36	
	Freight on chairs from Philadelphia.....	4 80	
	Freight on desks from Philadelphia.....	2 90	
	Freight on chairs from Philadelphia.....	4 80	
	Freight on two boxes of paper.....	2 07	
	Express on box of carpet.....	4 00	
Boyd & Waite Brothers	12 copies of Boyd's Washington City Directory for 1866 .....	.....	30 86
W. J. Harris	Washing 15 dozen towels.....	.....	30 00
William Twine	Washing 13 dozen towels in February, 1866 .....	.....	7 50
American Telegraph Company	1 telegram, dated Carson City, February 8, to Hon. J. G. Blaine .....	.....	6 50
William Windom.....	Newspapers, 1st session 39th Congress .....	.....	6 25
G. W. Scofield	do.....do.....	.....	50 00
G. C. Smith	do.....do.....	.....	50 00
W. A. Darling	do.....do.....	.....	50 00
Amasa Cobb	do.....do.....	.....	50 00
A. H. Coffroth	do.....do.....	.....	50 00
Ebenezer Dumont	do.....do.....	.....	50 00
J. M. Marvin	do.....do.....	.....	50 00
R. P. Spalding	do.....do.....	.....	50 00
G. S. Ordway	Page to Sergeant-at-arms, December, 1865 .....	.....	45 00
G. S. Ordway	Page to Sergeant-at-arms, January, 1866 .....	.....	58 00
W. B. Atkinson	Page, pay-roll for February, 1866 .....	.....	62 00
William Chapline.....	do.....do.....	56 00	
P. M. Devitt.....	do.....do.....	56 00	
J. R. Davis	do.....do.....	56 00	
Joseph Dyas	do.....do.....	56 00	

William Hill	do	56 00
W. D. Lauston	do	56 00
F. W. Larner	do	56 00
Edward Merritt	do	56 00
Richard Meade	do	56 00
W. E. Newman	do	56 00
S. H. Nealy	do	56 00
John Ogle	do	56 00
A. S. Pillsbury	do	56 00
W. C. Raymond	do	56 00
Theodore Slater	do	56 00
Henry Stewart	do	56 00
R. E. Stevens	do	56 00
H. C. Wall	do	56 00
E. H. Willard	do	56 00
C. G. Burlingame	Riding page, pay-roll for February, 1866	56 00
Frederick James	do	56 00
Austin Gardiner	do	56 00
C. H. Wade	do	14 00
Walter Burr	Temporary mail boy, pay-roll for February, 1866	75 00
W. S. Van Kueren	do	75 00
C. E. T. Bayley	Page in Clerk's office, House of Representatives, February, 1866	150 00
G. S. Ordway	Page to Sergeant-at-arms	56 00
F. & J. Rives	Reporting and publishing proceedings of the House of Representatives in the Daily Globe, from December 5, 1865, to January 31, 1866	56 00
C. Schneider	2 gong bells with copper wire and fixtures	3, 121 09
	2 large silk cords and tassels	15 00
	Drilling through four halls and hanging gongs	12 00
	18 large brass bolts made to order	30 00
		45 00
Green & Williams	6 wooden stools for folding-room	102 00
Green & Williams	1 office table	6 00
H. F. Baker	Clerk to Committee on the Militia, February, 1866	3 50
U. H. Painter	Clerk to Committee on the Post Office and Post Roads, February, 1866	112 00
T. A. Beaton	Use of horses and carriages for carrying the mails, February, 1866	112 00
Ira Goodnow	Use of horse and carriage, February, 1866	280 00
	Use of saddle-horse, February, 1866	70 00
		56 00
		126 00

1, 120 00

182 00

150 00

56 00

56 00

3, 121 09

102 00

6 00

3 50

112 00

112 00

280 00

126 00

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
T. M. Jacks	Compensation, expense, and mileage as a claimant for a seat in the House of Representatives, from Arkansas, in the 38th Congress.....	.....	\$2,000 00
John Gilbert.....	20 per cent. salary as messenger to Sergeant-at-arms, House of Representatives, from December 7, 1863, to February 29, 1864.....	.....	56 13
Ira Goodnow.....	Metropolitan railroad tickets used in February, 1866.....	.....	30 00
D. Van Nostrand.....	5 copies vol. 8, Rebellion Record.....	.....	24 00
Ira Goodnow.....	400 Georgetown and Washington street railroad tickets.....	.....	20 00
Clinton Lloyd	Freight paid on chairs from Philadelphia.....	.....	13 40
J. Holcomb.....	Revenue stamps furnished for receipts of Baltimore and Ohio railroad, to members of 39th Congress, for sets of Congressional Globe transported over that road in boxes.....	.....	2 50
E. C. Ingersoll.....	Newspapers, 1st session 39th Congress.....	.....	50 00
H. D. Washburn.....	Newspapers, 1st session 39th Congress.....	.....	50 00
A. A. Denny.....	Newspapers, 1st session 39th Congress.....	.....	45 00
M. C. Kerr.....	Newspapers, 1st session 39th Congress.....	.....	35 00
F. & J. Rives.....	Reporting and publishing 508 $\frac{2}{3}$ columns proceedings of the House of Representatives in the Daily Globe, February, 1866.....	.....	3,813 25
F. & J. Rives.....	22 sets Congressional Globe and Appendix, 68 volumes to a set, 1,896 volumes.....	.....	7,480 00
Columbus Stebbins.....	Folder, pay-roll for February, 1866.....	\$100 00	
A. J. Morey.....	do.....	100 00	
S. G. Bugh.....	do.....	100 00	
J. W. Nightingale.....	do.....	100 00	
H. W. Momson.....	do.....	100 00	
Paul Stevens.....	do.....	84 00	
William Dalton.....	do.....	84 00	
J. Q. Thompson.....	do.....	100 00	868 00
William Averill.....	Temporary clerk, pay-roll for March, 1866.....	150 00	
A. J. Larnier.....	do.....	150 00	
Venerando Pulizzi.....	do.....	150 00	
Judson Holcomb.....	do.....	125 00	
Ephraim Cowan.....	do.....	125 00	
W. W. Chase.....	do.....	100 00	
W. E. Dean.....	Temporary mail-boy, pay-roll for March, 1866.....	75 00	800 00

T. W. Burr	do	75 00	150 00
J. H. Riley	Clerk to Committee on Mines and Mining, from February 13 to March 31, 1866		188 00
J. A. McKean	Clerk to Committee on Commerce, February, 1866		112 00
V. E. Smalley	Clerk to Committee on Military Affairs, March, 1866		186 00
A. S. Perham	Clerk to Committee on Invalid Pensions, March, 1866		124 00
J. T. Williams	Clerk to Committee on Indian Affairs, March, 1866		124 00
D. W. Bartlett	Clerk to Committee of Elections, March, 1866		124 00
S. D. Lord	Clerk to Committee on Accounts, March, 1866		124 00
E. Stevens	Clerk to Committee for the District of Columbia, March, 1866		124 00
H. F. Baker	Clerk to Committee on the Militia, March, 1866		124 00
E. G. Bowdoin	Clerk to Committee on the Judiciary, March, 1866		124 00
E. S. Chapman	Clerk to Committee on the Territories, March, 1866		124 00
T. A. Beaton	Use of four horses and carryalls for carrying the mails, March, 1866		310 00
Clinton Lloyd	Use of three horses and carriages, March, 1866	77 50	232 50
Ira Goodnow	Use of horse and wagon, March, 1866	62 00	
	Use of one saddle-horse		139 50
J. T. Johnson	Laborer, pay-roll for March, 1866	55 80	
Lewis Saunders	do	55 80	
Alfred Dade	do	55 80	
Robert Watkins	do	55 80	
Henry Hall	do	55 80	
T. B. Bell	do	55 80	
J. W. Lee	do	55 80	
Lewis Cartwright	do	55 80	
W. A. Duckett	do	55 80	
Alexander Brice	do	55 80	
J. V. Johnson	do	55 80	
William Twine	do	55 80	
Aaron Russell	do	55 80	
W. H. Smith	do	62 00	
Aquilla Hall	do	62 00	
Francis H. Smith	Stenographer, March, 1866		849 40
J. D. Ward	Watchman, March, 1866		310 00
W. K. Mehaffy	Reading clerk, from January 1 to March 31, 1866		93 00
J. B. Clark, jr	Cartage of 155 loads of documents		90 00
William Twine	Washing 15 dozen towels		77 50
Henry Grider	Newspapers, 1st session 39th Congress		7 50
J. W. Longyear	do		50 00
	do		50 00

CONTINGENT EXPENSES OF

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
James Brooks	Newspapers, 1st session 39th Congress	.....	\$50 00
Philetus Sawyer	do	.....	50 00
J. H. Farquhar	do	.....	50 00
W. B. Atkinson	Page, pay-roll for March, 1866	\$62 00	
William Chapline	do	62 00	
Philip M. Devitt	do	62 00	
J. R. Davis	do	62 00	
Joseph Dyas	do	62 00	
William Hill	do	62 00	
W. D. Lanston	do	62 00	
F. W. Larner	do	62 00	
Edward Merritt	do	62 00	
R. Meade	do	62 00	
W. E. Newman	do	62 00	
S. H. Nealey	do	62 00	
John Ogle	do	62 00	
A. S. Pillsbury	do	62 00	
W. C. Raymond	do	62 00	
Theodore Slater	do	62 00	
Henry Stewart	do	62 00	
R. E. Stevens	do	62 00	
H. C. Wall	do	62 00	
E. H. Willard	do	62 00	
C. G. Burlingame	Riding page, pay-roll for March, 1866	62 00	1,240 00
Frederick James	do	62 00	
Austin Gardner	do	62 00	
C. E. T. Bailey	Page to Clerk of House of Representatives, March, 1866	.....	186 00
F. & J. Rives	Reporting and publishing proceedings of the House of Representatives in the Daily Globe during the month of March, 1866	.....	62 00
J. A. McKean	Clerk to Committee on Commerce, March, 1866	.....	3,969 39
J. L. Swift	Clerk to Committee on Foreign Affairs, March, 1866	.....	124 00
Harriet P. Phish	Services in ladies' retiring-room, February and March, 1866	.....	124 00
		.....	70 80

G. L. Ordway	Page to Sergeant-at-arms, March, 1866.....	.....	62 00
Francis Thomas	Stationery, 1st session 39th Congress .....	.....	62 58
James Brooks	do.....do.....	.....	67 71
F. & J. Rives.....	15 sets (68 volumes each) Congressional Globe and Appendix, from the 23d to the 38th Congress, inclusive—15+68=1,020 volumes.....	.....	5,100 00
L. L. Crounse	Clerk to Committee on Banking and Currency, from December 11, 1865, to March 31, 1866.....	.....	440 00
R. C. Walker	Clerk to Committee on War Debts of Loyal States, March, 1866.....	.....	.....
U. H. Painter	Clerk to Committee on the Post Office and Post Roads, March, 1866.....	.....	124 00
J. S. Read.....	Folder, pay-roll for February, 1866	100 00	.....
Theo. Blagne.....	do.....do.....	100 00	.....
Junius Simons	do.....do.....	100 00	.....
J. T. Chauncey	do.....do.....	100 00	.....
John Sterling.....	do.....do.....	100 00	.....
J. M. Shome.....	do.....do.....	84 00	.....
G. W. Nokes	do.....do.....	84 00	.....
A. H. Walcott	do.....do.....	84 00	.....
Benjamin Ross	do.....do.....	84 00	.....
William Cunningham	do.....do.....	84 00	.....
Philander Ward	do.....do.....	84 00	.....
Edward Luck	do.....do.....	84 00	.....
John Dwyer.....	do.....do.....	84 00	.....
Oliver Peabody.....	do.....do.....	84 00	.....
Lawrence Bess	do.....do.....	84 00	.....
C. W. Linthurst	do.....do.....	84 00	.....
D. C. Lewis	do.....do.....	84 00	.....
S. S. Strachan	do.....do.....	84 00	.....
H. C. Nagle	do.....do.....	84 00	.....
T. M. Killinger	do.....do.....	84 00	.....
B. D. Peck	do.....do.....	84 00	.....
J. W. Pettit	do.....do.....	84 00	.....
William Small.....	do.....do.....	84 00	.....
J. W. Pope.....	do.....do.....	84 00	.....
W. H. Boughter	do.....do.....	84 00	.....
T. P. Drew	do.....do.....	84 00	.....
H. W. McGeorge.....	do.....do.....	84 00	.....
J. L. McKee.....	do.....do.....	84 00	.....
H. L. Bonsall.....	do.....do.....	84 00	.....
W. S. Young	do.....do.....	84 00	.....
H. C. Sherrill.....	do.....do.....	84 00	.....
W. R. Smith.....	do.....do.....	84 00	.....
William Davis.....	do.....do.....	84 00	.....

CONTINGENT EXPENSES OF

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
W. G. Brower	Folder, pay-roll for February, 1866	\$84 00	
R. J. Bennett	do	84 00	
Samuel Ten Eyck	do	84 00	
C. H. Woods	do	84 00	
F. D. Curtis	do	84 00	
C. H. Coryell	do	84 00	
C. H. Gibson	do	84 00	
W. R. Mount	do	84 00	
D. A. Hull	do	84 00	
J. P. Peterson	do	39 00	
G. F. Colby	do	84 00	
H. W. Shipman	do	84 00	
S. D. Hills	do	36 00	
Samuel Dunn	do	30 00	
G. C. Poulton	do	24 00	
Ferdinand Irwin	do	84 00	
Harrison Weaver	do	84 00	
Briggs Thomas	do	84 00	
L. D. Lanien	do	84 00	
C. E. Cox	do	84 00	
Julius De Sauls	do	70 00	
Philip Nolan	do	50 40	
Robert Dunmore	do	50 40	
E. P. Ferris	do	84 00	
Marion Linville	do	84 00	
J. H. Hamilton	do	84 00	
Hiram Baldwin	do	56 00	
C. D. Choate	do	56 00	
P. B. Prince	do	56 00	
C. McConnell	Folder, pay-roll for February, 1866	56 00	
Sergeant Stelle	do	56 00	
John Moses	do	56 00	
George Scismore	do	18 00	
			\$4,867 80

186 00

Aaron Bradshaw	do	do	15 00
Edward Moore	do	do	8 90
George Prince	do	do	46 08
Charles Roe	do	do	7 37
William Nash	do	do	18 90
William Bradford	do	do	4 80
William D. Tabler	do	do	18 39
William Dubois	do	do	2 25
W. S. Dulin	do	do	18 78
J. A. Hurdle	do	do	2 15
O. V. Shome	do	do	21 15
Francis White	do	do	19 37
John Harris	do	do	17 04
Charles Wincher	do	do	13 60
George Mackey	do	do	7 65
William Sangston	do	do	14 50
Nelson Cart	do	do	13 70
Oscar Huguely	do	do	21 13
Otto Gaiges	do	do	11 50
John Lambert	do	do	14 00
John Daly	do	do	11 20
Dennis Killafoil	do	do	12 60
W. S. Sterling	do	do	1 30
Thomas Sheets	do	do	14 76
George Clift	do	do	11 51
Franklin Fuller	do	do	1 50
Edward Wilson	do	do	11 65
John Knaub	do	do	11 67
Francis Butterbaugh	do	do	11 90
John Jones	do	do	20 72
A. McH. Brown	do	do	4 40
C. A. Lochery	do	do	5 82
Albert Shaw	do	do	41 84
Thomas Tippet	do	do	6 75
Ringgold Young	do	do	2 45
Elick Hough	do	do	1 70
Mrs. Stillman Moores	67 buckets of paste, February, 1866	do	468 00
J. S. Read	Folder, pay-roll for March, 1866	do	100 00
Junius Simons	do	do	100 00

468 00
100 50

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
Theodore Blague	Folder, pay-roll for March, 1866.....	\$100 00	
John Sterling	do.....	100 00	
J. T. Channey	do.....	100 00	
T. M. Kellinger.....	do.....	93 00	
W. R. Mount.....	do.....	93 00	
W. G. Brower.....	do.....	93 00	
J. M. Shome	do.....	93 00	
A. H. Walcott.....	do.....	93 00	
John Dwyer.....	do.....	93 00	
P. Ward.....	do.....	93 00	
Oliver Peabody.....	do.....	93 00	
Briggs Thomas.....	do.....	93 00	
D. W. C. Lewis.....	do.....	93 00	
Harrison Weaver.....	do.....	93 00	
Ferdinand Irwin.....	do.....	93 00	
L. D. Lanien	do.....	93 00	
C. E. Cox.....	do.....	93 00	
Samuel Ten Eyck.....	do.....	93 00	
Marion Linville.....	do.....	93 00	
C. H. Gibson.....	do.....	93 00	
Samuel Dunn.....	do.....	93 00	
G. C. Poulton	do.....	93 00	
H. Z. Knapp.....	do.....	93 00	
Edward Tuck	do.....	93 00	
J. E. Hammond.....	do.....	93 00	
D. A. Hull.....	do.....	93 00	
William Moran.....	do.....	93 00	
J. W. Pope.....	do.....	93 00	
H. W. McGeorge.....	do.....	93 00	
J. L. McKee	do.....	93 00	
B. D. Peck.....	do.....	93 00	
J. W. Pettit.....	do.....	93 00	
H. L. Bonsall	do.....	93 00	
W. S. Young.....	do.....	93 00	

William Davis	do	93 00
W. H. Boughter	do	93 00
C. H. Woods	do	93 00
William Small	do	93 00
W. R. Smith	do	93 00
H. C. Sherrill	do	93 00
C. W. Linthurst	do	93 00
William M. Bahan	do	60 00
J. De Sauls	do	77 50
C. F. Rowe	do	50 00
Thomas Martin	do	55 80
Philip Nolan	do	55 80
Robert Dunmore	do	55 80
R. J. Bennett	do	93 00
S. S. Strachan	do	93 00
William Cunningham	do	93 00
C. D. Choate	do	62 00
P. B. Prince	do	62 00
Columbus Stebbins		100 00
A. J. Morey	do	100 00
S. G. Bugh	do	100 00
J. W. Nightingale	do	100 00
H. W. Momson	do	100 00
H. M. Maguire	do	100 00
Paul Stevens	do	93 00
William Dalton	do	93 00
J. Q. Thompson	do	100 00
Folder, pay-roll for March, 1866.		
Franklin Fuller	do	8 40
W. S. Duhn	do	23 25
John Harris	do	19 30
Aaron Bradshaw	do	15 60
Charles Wincher	do	28 20
Thomas Sheets	do	16 73
George Clift	do	13 45
O. V. Shome	do	20 00
Francis White	do	15 60
William Nash	do	22 15
Albert Shaw	do	42 94
Edward Wilson	do	14 41
Folder, pay-roll for March, 1866.		
W. S. Duhn	do	23 25
John Harris	do	19 30
Aaron Bradshaw	do	15 60
Charles Wincher	do	28 20
Thomas Sheets	do	16 73
George Clift	do	13 45
O. V. Shome	do	20 00
Francis White	do	15 60
William Nash	do	22 15
Albert Shaw	do	42 94
Edward Wilson	do	14 41

\$4,791 90

886 00

CONTINGENT EXPENSES OF

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
Amos McH. Brown	Folder, pay-roll, March, 1866	\$2 90	
William Bradford	do.....do.....	19 94	
Francis Butterbaugh	do.....do.....	13 00	
William Sangster	do.....do.....	20 65	
Oscar Huguely	do.....do.....	23 29	
William Dubois	do.....do.....	8 47	
George Prince	do.....do.....	34 76	
Otto Garges	do.....do.....	17 15	
Edward Moore	do.....do.....	26 65	
Charles Roe	do.....do.....	17 61	
John Jones	do.....do.....	28 17	
W. D. Tabler	do.....do.....	23 10	
John Daly	do.....do.....	18 62	
John Lambert	do.....do.....	25 90	
Charles Lochery	do.....do.....	17 40	
T. A. Tippet	do.....do.....	16 95	
Nelson Carr	do.....do.....	27 20	
John Knarb	do.....do.....	14 80	
Julian Hurdle	do.....do.....	11 65	
Ringgold Young	do.....do.....	80	
			\$609 04
Mrs. Stillman Moores	74 buckets of paste, March, 1866 .....	.....	111 00
J. D. Forney	Engineer, pay-roll for February, 1866	125 00	
J. H. Knox	do.....do.....	100 00	
W. B. Turner	do.....do.....	100 00	
H. S. Linker	do.....do.....	100 00	
J. H. Barker	do.....do.....	56 00	
C. P. Bundick	do.....do.....	56 00	
William Hutcheson	do.....do.....	56 00	
J. H. Garges	do.....do.....	56 00	
S. A. Wilkins	do.....do.....	56 00	
			705 00
J. D. Forney	Engineer, pay-roll for March, 1866	125 00	
J. H. Knox	do.....do.....	100 00	
W. B. Turner	do.....do.....	100 00	

H. S. Linker.....	do.....do.....	100 00	
J. H. Barker.....	do.....do.....	62 00	
C. P. Bundick.....	do.....do.....	62 00	
William Hutcheson.....	do.....do.....	62 00	
J. H. Garges.....	do.....do.....	62 00	
S. A. Wilkins.....	do.....do.....	62 00	735 00
Cornwall & Maddox.....	10 bolts on coal barrow.....	3 50	
	Straightening handles.....	2 00	
	Piecing bottom.....	6 00	
	4 plates.....	2 50	
	1 bracket and repairs to same.....	2 00	
	Setting axles.....	3 00	
	Cartage.....	2 00	
Kitty Bruce.....	Washing 211½ doz. towels.....		21 00
J. H. Garges.....	Hauling ashes, &c., from vaults, from December 22, 1865, to April 9, 1866, 300 loads.....		105 87
Cornwall & Maddox.....	Repairs to trucks, 8 new wheels.....		75 00
	8 boxes.....	8 00	
	Laying 4 axles and washers, &c.....	4 00	
	Cartage.....	8 00	
		3 00	
B. G. Wheeler.....	Furniture pay-roll, for February, 1866.....	150 00	23 00
Joseph Reese.....	do.....do.....	100 00	
John R. Hunt.....	Repairing 4 chairs for clerk's office.....	2 50	
	Repairing washstands.....	2 00	
	Repairing woodhod.....	1 00	
	Repairing stable door.....	1 00	
	200 boxes.....	700 00	
	Repairing 2 chairs.....	1 50	
	Repairing woodhod.....	1 12	
	Repairing 3 chairs.....	2 00	
	Shelving.....	5 50	
	Restaurant, partition in basement.....	23 87	
	Repairing desk.....	4 00	
	Door frame, door and cutting hole in wall.....	15 50	
	Walnut waste box, engineer's department.....	8 50	
	Putting on lock, engineer's department.....	50	
	Repairing door and hinges for outside door, engineer's department.....	1 25	
	Shelving in room 56, clerk's office.....	13 20	

Repairing washstand.....	1 00	
Repairing washstand.....	2 00	
Repairing table.....	2 25	
Repairing washstand.....	75	
Altering desk.....	2 50	
Repairing washstand.....	50	
1 16-foot step-ladder.....	9 00	
1 iron-bound truck body.....	12 00	
Mouldings.....	75	
50 extra size Congressional Globe boxes.....	175 00	
Hanging 3 pairs doors with patent hinges.....	12 00	
Walnut carpet strips, 380 feet.....	38 00	
Walnut footboard for 3 doors.....	7 50	
Repairs to Speaker's, Clerk's, and reporter's desks.....	18 00	
19 locks on desks.....	9 50	
16 irons for desk feet.....	4 00	
Putting on 6 sets door knobs.....	1 50	
Easing 6 pair doors.....	6 00	
Putting on 19 pair porcelain handles on doors.....	2 37	
Putting on 16 pair hooks and eyes on doors.....	2 00	
Putting on 16 bolts on doors.....	4 00	
Putting on mortise lock diplomatic gallery.....	1 00	
3 bowlboards in cloak room.....	6 00	
1 day's work assisting plumber.....	3 75	
Unhanging and rehanging 16 pair doors.....	8 00	
Repairing washstands in cloak room.....	6 00	
Mouldings in door.....	75	
Rehanging 2 pair doors.....	2 50	
1 lock and repairing doors.....	2 50	
Putting on patent springs on doors.....	1 50	
Repairing washstand.....	3 00	
Repairing 2 doors.....	3 00	
Boarding up doors and putting on lock.....	2 75	
		354 87
Joseph Reese.....	.....	80 00
B. G. Wheeler.....	.....	150 00
Joseph Reese.....	.....	100 00
		250 00
W. A. McCartney.....	.....	124 00
O. W. Palmer & Co.....	.....	239 10
Covering with cloth 40 doors around the hall House of Representatives.....	.....	
Furniture, pay-roll for March, 1866.....	.....	
do.....do.....do.....	.....	
Clerk Committee on Naval Affairs, March, 1866.....	.....	
25 ³⁷ / ₄₆ tons coal.....	.....	

CONTINGENT EXPENSES OF

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
E. Z. Steever	5 pounds solder	\$3 00	
	5 pounds putty	63	
	2 plumbers and assistants, 2 days	24 00	
	9 pounds solder	5 40	
	20 feet gas pipe	7 00	
	6 fittings	60	
	15 feet extra strong lead pipe	11 25	
	1 plumber and gas-fitter and assistants, 4 days	48 00	
	2 gas stoves	40 00	
	24 feet tubing	12 00	
	Burners, fittings, and nipples	2 50	
	2 gas-fitters and assistants, 2 days	24 00	
	12½ feet extra strong 1 inch lead pipe	12 50	
	9 pounds solder	5 40	
	25 hooks	1 50	
	1 plumber and assistant, 3 days	18 00	
	1 portable drop-light, complete, with burners	14 00	
	New pipe, socket, time and work	5 00	
Thomas A. Beaton	Hauling 1,151 loads of documents, March, 1866		\$234 78
	Hauling 975 loads of documents, January, 1866		575 50
	Hauling 901 loads of documents, February, 1866		487 50
	Journal clerk from November 1, 1865, to April 1, 1866		450 50
J. M. Barclay	Extra messenger in post office March 1, to April 1, 1866		141 36
W. H. H. Camp	Newspapers, 1st session 39th Congress		75 00
John F. Driggs	92,500 buff envelopes, 7½ by 3½		50 00
Philp & Solomons	20 reams ruled cap	291 37	
	2 dozen French carmine ink	135 40	
	9 portmonaies	6 00	
	9 portmonaies	30 00	
	6 portmonaies	33 00	
	181,000 speech envelopes	46 50	
	200,000 speech envelopes	476 03	
	119,000 speech envelopes	526 00	
	2 stamping dies, to order	312 97	
		5 00	

2 diaries.....	4 00		
6 diaries, No. 135.....	6 00		2,224 54
6 diaries, No. 159.....	7 50		1,236 00
12 diaries, No. 144.....	30 00		302 50
3 five-quire records, cloth.....	13 50		
3 six-quire records, cloth.....	16 20		
20 pints French copying ink.....	25 00		
6 photograph albums.....	58 00		
1 ¹ / ₂ dozen scissors.....	5 00		
1 ¹ / ₂ dozen scissors.....	5 25		
1 dozen scissors.....	15 00		
10 dozen large mucilage.....	60 00		
1 dozen holders.....	10 50		
1 ¹ / ₂ dozen holders.....	21 00		
2 dozen holders.....	36 00		
2,000 French envelopes.....	6 50		
1 pamphlet case.....	50		
600 reams Manilla wrapping, 12 by 19.....	1,236 00		
1 blank book, indexed.....	2 00		
6 reams flat cap.....	40 32		
	3,460 54		
	1,236 00		
Deduct 60 reams Manilla wrapping, 12 by 19.....			
600 reams Manilla wrapping, 12 by 19.....			
Horse and carriage from December 1, 1865, to April 1, 1866.....			
200 crape scarfs.....	250 00		
12 ¹ / ₂ dozen kid gloves.....	450 00		
4 dozen kid gloves.....	108 00		
6 dozen kid gloves.....	180 00		
4 white silk scarfs.....	40 00		
Crape for members on death of Hon. Orlando Kellogg.....	100 00		1,028 00
Crape, &c., on death of Hon. Jacob Collamer.....	100 00		200 00
Arresting, keeping, and discharging the following-named members of the House, on a call of the House, March 25, 1864: J. C. Allen, S. H. Boyd, A. H. Coffroth, J. A. J. Creswell, H. W. Davis, J. R. Eden, J. F. Farnsworth, W. A. Hall, J. H. Hubbard, William Johnson, A. A. King, J. F. McKinney, Amos Myers, J. W. Patterson, J. H. Rice, J. C. Robinson, R. C. Schenck, J. G. Scott, R. P. Spalding, Myer Strouse, M. R. Thayer, W. B. Washburne, A. C. Wilder, at \$3 20 each.....			73 60

A.—Detailed statement of disbursements, &c.—Continued.

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
W. H. and O. H. Morrison . . .	1 Trial of Aaron Burr 24 Brightly's Digest, vol. 2 1 Curtis's Decisions of Supreme Court 6 Lanman's Dictionary of Congress 3 Worcester's Dictionary 3 Webster's Dictionary 1 Sharswood Blackstone, 2 volumes 1 Halleck's Laws of War 1 Wheaton's International Law 1 Story's Conflict of Laws 1 Conkling's Admiralty Reports 1 Conkling's Treatise 1 Worcester's Dictionary 1 Opinions of Attorney General, 8 volumes 1 Bishop on Criminal Law, 2 volumes 1 Story on the Constitution, 2 volumes 1 Bouvier's Law Dictionary, 2 volumes 1 Rawle on the Constitution 1 Sedgwick on Statutory Law 1 Hurd on Habeas Corpus	\$3 50 156 00 110 00 18 00 36 00 36 00 10 00 6 00 7 50 7 50 11 00 8 00 12 00 28 00 15 00 8 00 10 00 7 50 6 50 6 50	\$503 00
G. M. Wight	1 oak pedestal desk 1 walnut pedestal desk 1 large solid walnut revolving chair 1 hat-rack 1 hat-rack 1 oak pedestal desk 1 office table 1 walnut desk 9 large solid walnut revolving chairs 1 walnut hat-rack	55 00 55 00 35 00 20 00 28 00 68 00 24 00 38 00 315 00 28 00	666 00 375 00
G. M. Wight	1 large solid walnut case, made to order Altering die from 1861 to 1863 Altering die from 1864 to 1865	1 00 1 00	

369 reams Manilla wrapping, 19 by 24.....	1,531 00	
1 die, engraved "Pub. Doc.—Rep't on Indian Affairs".....	6 00	
60½ reams Manilla wrapping, 19 by 24.....	251 08	
64 reams Manilla wrapping, 19 by 24.....	265 60	
104 reams Manilla wrapping, 19 by 24.....	431 64	
58,000 speech envelopes.....	152 54	
108 reams Manilla wrapping, 27 by 37.....	858 60	
4 dies, cut to order.....	16 00	
3 dies, cut to order.....	12 00	
18,500 speech envelopes.....	58 23	
99 reams Manilla wrapping, 27 by 37.....	787 05	
1 scrap-book.....	2 75	
	4,374 85	
12 dozen huck damask towels.....	126 00	
72 dozen extra length laces.....	32 40	
	158 40	
1 Lippincott's Gazateer.....	120 00	
300 skins parchment.....	231 00	
525 pounds twine.....	18 00	
4 reams rough hand-made note.....	14 00	
2,000 rough hand-made envelopes.....	3 00	
2 blank books.....	20 00	
Printing 4 reams note, "Committee of Ways and Means".....	25 00	
Engraving steel plate for Committee of Ways and Means.....	18 37	
29 pen-racks.....	3 00	
3 pen-racks.....	22 50	
3 dozen erasers.....	6 00	
750 square white envelopes.....	8 88	
1 dozen pen-wipers.....	203 10	
30 reams ruled cap.....	2 25	
3 pen-racks.....	72 00	
12 rubber and gold pencil cases.....	96 00	
Do.....do.....	15 00	
6 gold pens, assorted.....	1 00	
1 pair dividers, Naval Committee.....	4 50	
1 gross rubber bands.....	1 50	
Do.....do.....	1 50	
Do.....do.....	2 00	
Do.....do.....	4 00	
	899 60	
J. J. May & Co.....		
Philp & Solomons.....		
Philp & Solomons.....		

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
Edwin Stevens	Clerk to Committee for the District of Columbia, April, 1866.....	.....	\$120 00
W. J. Murtagh & Co.	Advertising in National Republican proposals for paper and twine .....	.....	28 00
James F. Moore.....	1 barrel tallow, 233 pounds .....	.....	36 12
William Stickney.....	94,500 7½ envelopes .....	.....	269 33
W. J. Murtagh & Co.....	Advertising proposals for ice.....	\$6 25	
	Advertising proposals for stationery.....	56 00	
William Simons	5 days' work, with laborer	30 00	62 25
	333 brick	4 67	
	1 barrel of cement.....	3 00	
	½ day's work, with laborer	3 00	
	Do.....do.....	3 00	
	½ barrel of cement.....	50	
	40 brick	60	
	2 days' work; with laborer.....	12 00	
	½ barrel cement.....	1 50	
	100 brick.....	1 50	
	2 days' work, with laborer	12 00	
	½ barrel cement.....	1 50	
	150 brick	2 25	
	1 barrel lime	1 00	
	1 day's work, with laborer.....	6 00	
	½ barrel of cement.....	50	
	1 day's work, with laborer	6 00	
	½ barrel of cement	50	
W. B. Moses	1 hat-rack.....	.....	88 52
Lawrence Bess	Services in folding-room, in March, 1866.....	.....	25 00
Hiram Baldwin.....	Folder, pay-roll for January, 1866.....	62 00	77 50
C. D. Choate	do.....do.....	62 00	
A. T. Gardner.....	do.....do.....	62 00	
P. B. Prince	do.....do.....	62 00	248 00

T. W. Price	15,000 large envelopes, printed.....	210 00	
	24,000 letter envelopes, printed.....	192 00	
	24 reams letter paper	228 00	
	24 reams letter paper	228 00	
	56 reams note paper.....	336 00	
	20 reams note paper.....	126 00	
	2 reams letter paper	16 00	
	7 cases, and portorage	11 40	
	Freight, prepaid	8 50	1,630 90
T. W. Price	50 reams printed note paper.....	300 00	
	20 reams printed letter paper.....	190 00	
	10,000 printed envelopes, large.....	140 00	
	30,000 printed envelopes, small	240 00	
	4 boxes	4 00	
	Paid freight.....	4 18	878 18
T. W. Price	10,000 printed letter envelopes	85 00	
	Freight	1 50	86 50
Evening Telegraph	Advertising proposals for stationery for January, 1866.....	.....	26 00
J. H. Orne & Co.....	1,106 $\frac{1}{4}$ yards Wilton carpet.....	5,531 25	
	177 $\frac{3}{4}$ yards Wilton carpet.....	888 75	
	Expenses on 8 eagles.....	100 00	
	531 $\frac{3}{4}$ yards tapestry carpet.....	1,137 67	
	38 $\frac{1}{4}$ yards Wilton carpet.....	181 25	
	14 yards green and black druggets	84 00	
	100 yards Wilton carpet.....	500 00	
W. & J. Allen & Brother.....	1 walnut revolving chair.....	15 50	
	1 walnut table.....	225 00	
	1 walnut table.....	225 00	
	1 walnut table.....	190 00	
	1 walnut table.....	175 00	
	Freight and packing.....	50 00	
	12 walnut revolving chairs.....	242 00	
	12 walnut revolving chairs.....	242 00	
	24 walnut revolving chairs.....	484 00	
Watson & Janney	2 pieces dark blue billiard cloth	387 50	1,848 50

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
Watson & Janney—Continued	1 piece dark blue billiard cloth.....	\$197 50	
	1 piece green billiard cloth.....	125 00	
	7 pieces damask.....	489 69	
	1 gross dark blue gimp.....	11 00	
	525 yards drab silk gimp.....	99 00	\$1,310 44
Bailey & Co	1 marble clock.....	90 00	
	1 marble clock.....	93 00	
	1 marble clock.....	87 00	
	1 marble clock.....	90 00	
Field & Hardie.....	6 dozen four-tumbler mortise desk locks.....	180 00	360 00
	1 gross screws.....	40	
D. R. & S. D. Large	1 office table.....	49 00	
	1 office table.....	49 00	
	1 office table.....	49 00	180 40
D. R. & S. D. Large	1 office desk, (Committee on Appropriations).....	75 00	
	1 office desk, (Committee on Military Affairs).....	63 00	147 00
D. R. & S. D. Large	1 office desk, (Committee on Invalid Pensions).....		
W. & J. Allen & Brother	1 imitation ebony sofa.....	135 00	138 00
	1 imitation ebony arm chair.....	62 00	58 00
	1 imitation ebony ladies' chair.....	60 00	
	4 imitation ebony wall chairs.....	100 00	
	2 imitation ebony easy chairs.....	120 00	
	1 imitation ebony sofa table.....	125 00	
	1 imitation ebony cabinet pedestal.....	65 00	
	2 walnut sofas, 2 walnut arm chairs, 2 walnut window chairs	356 00	
	2 walnut easy chairs.....	116 00	
	1 walnut table	70 00	
	1 walnut cabinet pedestal.....	50 00	
	Boxing.....	30 19	1,289 19

296 62

Charles Dean.....	339 pounds twine.....	9 00
E. Z. Steever.....	10 pounds of solder, new springs.....	63 00
	3 plumbers and assistants, 3 days.....	14 00
	1 portable drop-light with burners, &c.....	12 00
	2 globe valves, and fixing in.....	60 50
	1 boiler with coil, 1 globe wheel.....	1 00
	2 solid extra heavy steam plugs.....	4 20
	7 feet steam pipe.....	50
	1 foot steam pipe.....	4 50
	2 nipples, union.....	6 00
	1 wrought-iron frame for boiler.....	3 50
	New springs, washers, and fittings.....	40
	2 fittings.....	63 00
	3 plumbers and assistants 3 days.....	3 00
	New washers, screws, and nuts.....	7 00
	Plumber and assistant, 1 day.....	13 00
	1 gilt and fancy washbasin, plaster of Paris.....	30 00
	20 feet water pipe.....	4 50
	4 2-inch fittings, 1 2-inch solid plug.....	9 50
	1 2-inch nipple, 1 lead trap, 1 trap and screw.....	6 00
	1 ½ 2-inch lead pipe, 1 lead bend.....	13 00
	1 brass strainer, 20 pounds solder.....	3 40
	10 pounds sheet lead, 6 large hooks.....	84 00
	3 plumbers and assistants, 4 days.....	2 25
	7 copper straps, — screws.....	1 35
	9 large pipe hoops.....	10 00
	2 plumbers, 1 day.....	3 50
	10 feet gas pipe.....	15 00
	20 feet water pipe.....	6 75
	1 2-inch fitting, 1 2-inch union, 1 1-inch union.....	7 90
	1 large globe valve, 7 3-inch fitting.....	3 70
	1 2-inch nipple, 8 large pipe hoops.....	35 00
	2 plumbers and assistants, 2 ½ days.....	1 50
	1 ¾ socket, 1 ¾ nipple plaster of Paris.....	4 80
	8 pounds solder.....	42 00
	3 plumbers and assistants, 2 days.....	1 50
	Plaster Paris and copper wire.....	28 00
	2 plumbers and assistants, 2 days.....	40 00
	2 dozen fancy cut glass globes.....	16 00
	1 star pattern.....	30 00
	½ dozen large torches with oiled walnut handles.....	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
E. Z. Steever—Continued	6 $\frac{3}{8}$ valves.....	\$24 00	
	22 $\frac{3}{8}$ feet $\frac{1}{2}$ -inch pipe.....	13 60	
	5 feet $\frac{1}{2}$ -inch pipe.....	2 50	
	15 feet $\frac{3}{8}$ -inch pipe.....	6 00	
	3 feet brass pipe.....	75	
	2 $\frac{1}{4}$ unions, 1 $\frac{1}{2}$ union.....	7 00	
	3 $\frac{3}{8}$ unions. 1 1-inch to $\frac{1}{2}$ bushing.....	4 90	
	3 reducing sockets, 3 $\frac{3}{8}$ nipples.....	2 10	
	3 $\frac{1}{4}$ to $\frac{1}{2}$ bushing, 8 $\frac{3}{4}$ fittings.....	2 60	
	4 $\frac{1}{2}$ fittings, 5 $\frac{3}{8}$ fittings.....	1 45	
	12 pounds solder.....	7 20	
	3 hooks.....	30	
	2 plumbers and assistants, 3 days.....	36 00	
	3 brass globe lanterns for coal oil.....	21 00	
	1 argand burner chimney.....	30	
	2 steam fitters and assistants 2 days.....	24 00	
	1 marble overflow basin, plasters, washers, &c.....	8 00	
	2 plumbers 1 day.....	10 00	
	New washers and plaster of Paris.....	1 50	
	2 plumbers 1 day.....	10 00	
	10 feet extra strong lead pipe.....	10 00	
	8 $\frac{1}{2}$ pounds solder.....	5 10	
	7 pounds putty, new washers, plaster of Paris.....	2 23	
	1 2-inch globe valve, 2 brass bolts and screws.....	14 75	
	2 plumbers and 2 assistants 4 days.....	48 00	\$927 53
J. B. Warder.....	6 cords hickory wood.....	72 00	
	Sawing.....	9 00	81 00
Washington Chronicle.....	Advertising proposals for ice.....	7 50	
	do.....do.....coal.....	6 00	
	do.....do.....correction in above.....	1 50	
	do.....do.....fuel.....	16 00	30 00

A. W. Clarke.....	Expenses incurred travelling to and from and in the city of Washington, in the months of May and June, 1865, while engaged in making distribution of certain books and documents under the joint resolution of Congress approved February 28, 1865.....	250 00
R. U. Sherman	"Tally clerk," from January 1 to March 31, 1866.....	90 00
J. U. Foster	1 American flag, best material, 15 feet in length.....	25 50
John Wahl	Cleaning and repairing French clock.....	10 00
	Cleaning and new spring in French clock.....	10 00
Dempsey & O'Toole	10,000 white thick adhesive envelopes, 10½ by 4½.....	120 00
	½ gross 4-inch flat glass inkstands.....	20 00
	10 dozen ivory propelling pencils.....	60 00
	2 dozen gold pen nibs.....	32 00
	15 gross black swan quill pens.....	135 00
	50 gross Gillott's steel pens.....	70 00
D. C. Forney.....	Advertising proposals for stationery.....	437 00
John Becket	Services in the folding-room from April 1 to September 15, 1865.....	112 00
Cornwall & Maddox	Repairs to wheelbarrows, new legs, rounds and bottom.....	252 00
	Piecing leg stays.....	2 50
	6 rivets.....	1 00
	11 bolts.....	90
	Sheet-iron bottom and half side.....	2 75
	Cartage.....	12 00
	New hub and spokes.....	1 00
	Cutting tire.....	3 00
	Piecing leg stay.....	1 00
	2 journals and spindles.....	50
	5 bolts.....	2 00
	Cartage.....	1 25
		1 00
A. C. Baldwin.....	Amount allowed by resolution of House of Representatives of February 14, 1866, as contestant of seat of R. E. Trowbridge.....	28 90
D. B. Clarke	1 pound refined gum camphor.....	1 75
	½ dozen Schwerin's powders.....	1 50
	2 pounds refined gum camphor.....	3 50
	3 dozen assorted soap, at \$2 25.....	6 75
	3 pounds copperas, at 15 cents.....	45
	3 pounds chloride of lime, at 25 cents.....	75
	1 box, 34 pounds, castile soap.....	12 24
	1 box assorted toilet soap.....	6 75
		1,500 00

CONTINGENT EXPENSES OF

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
D. B. Clarke—Continued	French chalk.....	\$0 50	
	3 dozen toilet soap, assorted.....	6 75	
	1 cask (462 pounds) soda.....	41 58	
	1 dozen boxes (72 pounds) paraffine candles.....	40 32	\$122 24
D. B. Clarke	4 dozen paste brushes.....	10 40	
	2 dozen nail brushes.....	13 00	
	4 dozen whisk brushes.....	21 00	
	2 dozen rubber combs.....	20 00	
R. W. Clark.....	Newspapers, 1st session 39th Congress.....		64 40
R. P. Buckland.....	do.....do.....		50 00
Daniel Young.....	1 Map-chart of the World, for Committee on Commerce.....		50 00
J. B. Merritt.....	Attendance as a witness before Judiciary Committee, investigating matter of Davis and Clay, 1 day.....		8 00
Hudson Taylor	1 blank book.....	2 50	2 00
	1 dozen knives.....	35 50	
	$\frac{2}{3}$ dozen knives.....	20 00	
	$\frac{1}{2}$ dozen knives.....	25 00	
	1 dozen knives.....	20 00	
	1 dozen knives.....	31 00	
	$\frac{1}{6}$ dozen knives.....	9 53	
	$\frac{2}{3}$ dozen knives.....	23 68	
	$\frac{1}{2}$ dozen knives.....	19 25	
	$\frac{1}{3}$ dozen knives.....	26 67	
	$\frac{1}{2}$ dozen knives.....	35 00	
	1 dozen knives.....	33 75	
	1 dozen knives.....	41 50	
	1 dozen knives.....	42 00	
	$\frac{4}{5}$ dozen knives.....	30 00	
	1 dozen knives.....	34 50	
	$\frac{1}{2}$ dozen knives.....	47 92	
	1 dozen knives.....	30 00	
	$\frac{1}{6}$ dozen knives.....	7 00	

S. McLean	$\frac{1}{2}$ dozen knives	4 90	588 63
Hudson Taylor	$\frac{1}{2}$ dozen knives	5 33	21 27
	$\frac{1}{2}$ dozen knives	5 00	
	$\frac{1}{2}$ dozen knives	10 00	
	$\frac{1}{2}$ dozen knives	10 67	
	Stationery, 2d session 38th Congress	-----	
	52,000 speech envelopes	202 80	
	52,000 speech envelopes	202 80	
	26,000 speech envelopes	101 40	
	50,000 speech envelopes	195 00	
	56,000 speech envelopes	218 40	
	28,000 speech envelopes	109 20	
	85,500 speech envelopes	333 45	
	26,000 speech envelopes	101 40	
D. C. Forney	Advertising proposals for paper and twine	36 00	1,464 45
	Advertising proposals for ice	7 50	
	Advertising proposals for stationery	68 00	
E. Z. Steever	1 drop-light, with 12 feet patent hose, &c	20 00	111 50
	Brass hinges, screws, solder, and lead, for urinals	7 00	
	New washers and 6 pounds lead	2 25	
	2 plumbers and assistants 3 days	42 00	
	4 feet $1\frac{1}{4}$ inch lead pipe	5 00	
	Plaster of Paris, putty, &c	2 50	
	20 pounds solder	12 00	
	2 plumbers and assistants 3 days	42 00	
	$1\frac{1}{2}$ foot gas pipe	53	
	3 $\frac{3}{8}$ fittings and 1 $\frac{3}{8}$ union	1 95	
	2 plumbers 2 days	20 00	
Thomas A. Beaton	4 horses and carryalls for carrying the mails, from April 1 to 31, at \$10 per day	-----	155 23
Clinton Lloyd	3 horses and carriages for the use of Clerk's office during April, 1866, at \$2 50 each per day	-----	300 00
C. W. Boteler & Son	1 water-cooler	-----	225 00
	6 feather dusters	25 00	
	1 dozen feather dusters	24 00	
	1 stencil plate	46 00	
	3 clothes baskets	2 00	
	4 market baskets	12 00	
	1 dozen brass candlesticks	8 00	
		9 00	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
C. W. Boteler & Son—Cont'd	1 brass fender and 1 pair andirons	\$35 00	
	1 dozen rubber mats	42 00	
	1 dozen shoe brushes and 1 dozen flesh brushes	24 00	
	4 dozen paste brushes	20 00	
	2 dozen rosewood clothes brushes	24 00	
	1 dozen waste-paper baskets	12 00	
	2 dozen Elney nail brushes	24 00	
	6 dozen hair brushes	162 00	
	2 dozen hat brushes	24 00	
	32 inlaid hair brushes	112 00	
	1 box (36 pounds) candles	23 40	
	8 boxes (25.4 pounds) imported castile soap	96 52	
	6 boxes (408 pounds) soap for washing paints	106 08	
	10 dozen combs and 5 dozen chamois skins	150 00	
	1 dozen corkscrews	9 00	
	69 dozen pieces soap	207 00	
	6½ dozen feather dusters	351 00	
	1½ dozen dust pans	9 00	
	4 dozen spittoons	36 00	
	1 dozen brush trays	18 00	
	4 dozen soap boxes	36 00	
	6 dozen tumblers	30 00	
	6 quart buckets	10 50	
	½ dozen wash bowls	9 00	
	6 dozen corn brooms, large	54 00	
	2 dozen hair brooms, large	120 00	
	4 dozen large wood buckets	48 00	
	2 pair china spittoons	14 00	
	1 large wire fender	10 00	
	2 silver-plated ice pitchers	42 00	
	2 silver-plated waiters	29 00	
	Engraving pitcher and waiter	10 00	
	1 dozen goblets, 6 dozen whisks	42 00	
	1 paste mug, 2 dozen spittoons	32 00	

Sandy Bruce, jr	2 dozen large rubber spittoons	72 00	\$2, 629 75
Mrs. J. D. Ward	2 dozen nail brushes, 2 dozen ice picks	36 00	177 00
John B. Clark, jr	1 coal hod, 6 dozen tumblers	32 25	90 00
William A. Smith	1 pair brass andirons	7 50	75 00
	1 brass fender	12 00	
	1 set fire irons	7 00	
	1 bronze fire standard	3 00	
	1 dozen door mats	30 00	
	4 dozen spittoons	36 00	
	2 dozen paper baskets	40 00	
	1 dozen tin buckets, 15 dozen soap	72 00	
	2 dozen brooms, 1 dozen dust pans	24 00	
	1 dozen waste paper baskets	20 00	
	6 dozen tumblers	30 00	
	2 dozen white spittoons	36 00	
	2 water coolers	50 00	
	2 dozen bath brushes	24 00	
	Services in bath-room from December 4, 1865, to March 31, 1866		
	Services as watchman, &c., April		
	Cartage of 150 loads public documents during April, at 50 cents		
	Services as messenger in the House library, under a resolution of the House, from February 1 to March 31, 1866, at 50 cents per day		
	Services as messenger in House library for April, 1866		
	Washing 14½ dozen towels, at 50 cents		
	Services as page in the office House of Representatives for April, 1866		
	300 boxes carbonized steel pens		
	20 reams letter paper	118 00	
	15,000 extra thick envelopes	157 50	
			275 50
L. H. Schneider	1 lock	2 25	
	6 night latches	9 00	
	1 padlock	1 75	
	2 cupboard locks	1 31	
	1 drawer lock	68	
	1 dozen hooks and eyes	1 00	
	1 pair gas plyers	1 75	
	1 lock for Speaker's desk	1 50	
	1 spring bolt	50	
	1 dozen porcelain knobs	1 25	
	1 dozen cupboard buttons	25	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
L. H. Schneider—Continued ..			
	4 dozen blank keys	\$1 00	
	1 drawer lock	25	
	2 large fire shovels	2 50	
	3 dozen night blanks	6 00	
	3 dozen hooks and eyes	3 00	
	6 papers 24-ounce tacks	1 20	
	1 tumbler, brass padlock	1 75	
	1 dozen brass key blanks	1 00	
	1 pair gas plyers	1 75	
	Services as clerk to Committee on Accounts, April, 1866		\$39 69
Samuel D. Lord	Services as clerk to Committee on Judiciary, April, 1866		120 00
E. G. Bowdoin	Use of 1 horse and wagon for April, 1866		120 00
Ira Goodnow	Use of 1 saddle-horse for April, 1866	75 00	
	Services as stenographer for April, 1866	60 00	
F. H. Smith	Amount paid for street car tickets used during March, 1866		135 00
Ira Goodnow	Reporting and publishing in the Daily Globe 416 ¹ / ₂ columns, in April, 1866		300 00
F. and J. Rives	Temporary clerk, pay-roll for April, 1866		30 00
William Averill	do		3,124 11
Andrew J. Larner	do	150 00	
Venerando Pulizzi	do	150 00	
Judson Holcomb	do	150 00	
Ephraim Cowan	do	125 00	
Walter W. Chase	do	125 00	
	do	100 00	
	Folder, pay-roll for April, 1866		800 00
C. Stebbins	do	100 00	
A. J. Morey	do	100 00	
Samuel G. Bugh	do	100 00	
James W. Nightingale	do	100 00	
H. W. Morrison	do	100 00	
H. M. Maguire	do	100 00	
Paul Stevens	do	90 00	
William Dalton	do	90 00	
J. Q. Thompson	do	100 00	
Jacob D. Forney	Engineer, pay-roll for April, 1866	125 00	880 00

J. H. Knox	do	do	100 00
William B. Turner	do	do	100 00
H. S. Linker	do	do	100 00
J. H. Barker	do	do	60 00
C. P. Bundick	do	do	60 00
William Hutchison	do	do	60 00
J. H. Garges	do	do	60 00
Samuel A. Wilkins	do	do	60 00
Laborer, pay-roll 3d and 4th quarters 1865, and 1st quarter 1866			725 00
J. H. Barker	do	do	109 60
J. O'Brien	do	do	66 00
C. P. Bundick	do	do	43 60
W. McCoy	do	do	49 20
J. H. Garges	do	do	109 60
Samuel A. Wilkins	do	do	109 60
Laborer, pay-roll for April, 1866			548 00
John T. Johnson	do	do	54 00
Lewis Saunders	do	do	54 00
Alfred Dade	do	do	54 00
R. Watkins	do	do	54 00
Henry Hall	do	do	54 00
Thomas P. Bell	do	do	54 00
J. W. Lee	do	do	54 00
Thomas Cartwright	do	do	54 00
William A. Duckett	do	do	54 00
Alexander Bruce	do	do	54 00
J. V. Johnson	do	do	54 00
William Twine	do	do	54 00
Sandy Bruce, jr	do	do	54 00
Aaron Russell	do	do	45 00
Aquilla Hall	do	do	60 00
Page, pay-roll for April, 1866			813 00
William B. Atkinson	do	do	60 00
William Chapline	do	do	60 00
P. M. Devitt	do	do	60 00
J. R. Davis	do	do	60 00
J. Dyas	do	do	60 00
William Hill	do	do	60 00
W. D. Lanston	do	do	60 00
F. W. Larner	do	do	60 00
E. Merritt	do	do	60 00

CONTINGENT EXPENSES OF

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
William E. Newman	Page, pay-roll for April, 1866.....	\$60 00	
S. H. Nealy	do.....do.....	60 00	
J. Ogle	do.....do.....	60 00	
A. S. Pillsbury	do.....do.....	60 00	
William C. Raymond	do.....do.....	60 00	
T. Slader	do.....do.....	60 00	
H. Stewart	do.....do.....	60 00	
R. S. Stevens	do.....do.....	60 00	
H. C. Wall	do.....do.....	60 00	
E. H. Willard	do.....do.....	60 00	
J. B. Moses	do.....do.....	60 00	\$1,200 00
C. G. Burlingame	Riding page, pay-roll for April, 1866.....	60 00	
F. P. James	do.....do.....	60 00	
A. F. Gardner	do.....do.....	60 00	
William E. Dean	Temporary mail boy for April, 1866.....	75 00	180 00
B. M. Van Keuren	do.....do.....	75 00	
B. G. Wheeler	Furniture, pay-roll for April, 1866.....	150 00	150 00
Joseph Reese	do.....do.....	100 00	
V. E. Smalley	Services as clerk to Committee on Military Affairs, April, 1866.....	250 00	250 00
W. H. McCartney	Services as clerk to Committee on Naval Affairs, April, 1866.....	180 00	180 00
J. H. Riley	Services as clerk to Committee on Mines and Mining, April, 1866.....	120 00	120 00
R. C. Walker	Services as clerk to Committee on War Debts, &c., April, 1866.....	120 00	120 00
John L. Swift	Services as clerk to Committee on Foreign Affairs, April, 1866.....	120 00	120 00
Mrs. Stillman Moores	56 buckets paste, furnished in April, 1866.....	84 00	84 00
F. & J. Rives	4,780 copies each of volumes 1 and 2 of Congressional Globe and Appendix, for 1st session 39th Congress, being 24 copies each for 186 representatives and 9 delegates; and 100 copies for House library, amounting to 9,560 volumes of 800 pages each, at \$1 60.....		15,296 00
Ezra Davol	Services as clerk to Committee on Freedmen, during March and April, 1866.....		244 00
J. T. Williams	Services as clerk to Committee on Indian Affairs, April, 1866.....		120 00
D. W. Bartlett	Services as clerk to Committee of Elections, April, 1866.....		120 00
J. A. McKean	Services as clerk to Committee on Commerce, April, 1866.....		120 00

A. F. Baker.....	Services as clerk to Committee on the Militia, April, 1866.....	120 00
Harriet P. Phisk.....	Services in ladies' retiring room, April, 1866.....	45 00
T. T. Fowler & Co.....	4,974 pounds ice delivered in November, 1865.....	18 65
	523 pounds ice delivered in December, 1865.....	1 96
T. T. Fowler & Co.....	9,751 pounds ice delivered in January, 1866.....	20 61
T. T. Fowler & Co.....	10,769 pounds ice delivered in February, 1866.....	63 13
Thomas A. Beaton.....	Hauling 913 loads of documents in April, 1866, at 50 cents.....	80 76
William Cinn.....	Services as assistant mail boy in the post office during April, 1866.....	456 50
Kitty Bruce.....	Washing 197½ dozen towels in April, 1866, at 50 cents.....	100 00
James Black.....	Attendance as witness before the Committee on Agriculture, 1 day.....	98 54
Henry T. Blow.....	Newspapers, 1st session 39th Congress.....	2 00
William C. Bryant & Co.....	Evening Post from May 3, 1866, to May 3, 1867.....	50 00
Snow, Coyle & Co.....	Publishing proposals for paper and twine.....	12 00
	Do.....ice.....	27 00
	Do.....stationery.....	7 50
		48 00
William A. Darling.....	Stationery, 1st session 39th Congress.....	82 50
J. R. Hunt.....	1 extra large size box.....	5 00
	1 lock on box.....	75
	Harness room in stable.....	24 50
	1 chest.....	7 00
	1 chest.....	7 00
	200 boxes, at \$3 50.....	700 00
	2 press boards.....	2 50
	Repairing wood hod.....	1 00
	New tops to 2 Congressional Globe boxes.....	1 84
	Slat to rod for curtain.....	37
	1 chest.....	7 00
	1 case pigeon holes.....	6 00
	1 box.....	2 50
	1 box.....	3 50
	1 box.....	4 00
	1 box.....	5 00
	Altering door in stable.....	1 50
	1 extra box.....	3 00
	Shelving and closets in store-room.....	83 20
	1 extra box.....	3 50
	Hanging sash and cord, (document room).....	2 00
	46 brass guards for inkstands.....	11 50
	1 chest.....	7 00

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. R. Hunt—Continued	1 extra box.....	\$5 00	\$899 21
	Repairing door, (folding-room).....	1 25	
	24 file boards.....	2 40	
	2 locks on drawers.....	1 00	
I. S. Williams & Co.....	3 galvanized oyster steamers, at \$17 63.....	52 89	54 89
	Box and cartage	2 00	
Joseph S. Read	Folder, pay-roll for April, 1866.....	100 00	90 00
Junius Simons	do.....do.....	100 00	
Theodore Blague.....	do.....do.....	100 00	
J. Sterling.....	do.....do.....	100 00	
J. T. Chauncey	do.....do.....	100 00	
T. M. Kellinger	do.....do.....	90 00	
W. G. Brower.....	do.....do.....	90 00	
John M. Shomo.....	do.....do.....	90 00	
A. H. Walcott	do.....do.....	90 00	
John Dwyer.....	do.....do.....	90 00	
P. Ward	do.....do.....	90 00	
O. Peabody.....	do.....do.....	90 00	
B. Thomas	do.....do.....	90 00	
De W. C. Lewis.....	do.....do.....	90 00	
H. Weaver	do.....do.....	90 00	
F. Irvin.....	do.....do.....	90 00	
L. D. Lanien	do.....do.....	90 00	
C. E. Cox	do.....do.....	90 00	
S. Ten Eyck.....	do.....do.....	90 00	
C. H. Gibson	do.....do.....	90 00	
E. P. Ferris.....	do.....do.....	90 00	
P. H. Griswold.....	do.....do.....	90 00	
E. W. Morse.....	do.....do.....	90 00	
G. C. Poulton	do.....do.....	90 00	
E. Frick	do.....do.....	90 00	
J. E. Hammond.....	do.....do.....	90 00	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
C. Roe.....	Folder, pay-roll for April, 1866.....	\$18 46	
William Bradford.....	do.....	21 05	
C. Watson.....	do.....	7 50	
C. Wincher.....	do.....	26 74	
A. Bradshaw.....	do.....	20 60	
O. V. Shomo.....	do.....	24 87	
J. Daly.....	do.....	17 85	
N. Carr.....	do.....	19 60	
J. Lambert.....	do.....	18 97	
E. Moore.....	do.....	28 16	
A. Shaw.....	do.....	35 52	
G. Prince.....	do.....	32 67	
William D. Tabler.....	do.....	8 05	
William Nash.....	do.....	5 36	
John Jones.....	do.....	6 09	
Thomas H. Tippetts.....	do.....	20 23	
William S. Dulin.....	do.....	18 47	
William Langston.....	do.....	21 90	
F. Butterbaugh.....	do.....	14 70	
Charles Lochery.....	do.....	3 50	
O. Garges.....	do.....	11 15	
T. Sheets.....	do.....	16 15	
J. Knoub.....	do.....	10 00	
George Clift.....	do.....	10 11	
Robert Dunmore.....	Services as laborer in folding-room, from December 21 to 31, 1865.....	19 80	\$517 47
	Do..... May 1 to 10, 1865.....	18 00	
S. J. Bowen.....	Excess of postage charged on letters and packages to members of Congress, from January 1 to March 31, 1866.....		37 80
Albert P. Davis.....	Services as additional clerk to Sergeant-at-arms, April, 1866.....		324 85
Harper & Mitchell.....	31½ yards crape, at \$1 25.....	39 38	125 00
	1 piece crape.....	10 00	
	1 piece ribbon.....	2 00	

Joseph F. Gedney	Cotton.....	10	51 48
Welch & Robb.....	Heading 6 reams note paper.....	.....	20 16
G. L. Ordway.....	Daily Age furnished to John A. Nicholson, 1½ months .....	.....	1 50
Thomas W. Price.....	Services as page to Sergeant-at-arms, April, 1866.....	.....	60 00
	9 reams printed letter paper.....	81 00	
	8 reams printed note paper.....	48 00	
	1 box.....	75	
			129 75
W. D. Wallach.....	Advertising proposals for paper and twine.....	27 00	
	Do.....do.....ice.....	6 25	
	Do.....do.....stationery.....	52 00	
J. W. Forney	Advertising proposals for paper and twine.....	.....	85 25
Crossbys.....	14½ yards Mosaic Brussels carpet, at \$5.....	72 50	20 40
	51 yards Mosaic Brussels carpet, at \$3 50	178 50	
			251 00
U. H. Painter	Services as clerk to Committee on the Post Office and Post Roads, April, 1866.....	.....	120 00
A. S. Perham	Services as clerk to Committee on Invalid Pensions, April, 1866 .....	.....	120 00
E. S. Chapman	Services as clerk to Committee on the Territories, April, 1866 .....	.....	120 00
Snow, Coyle & Co.....	Publishing list of appropriations, 882 squares.....	.....	1,323 00
Joseph F. Gedney	Heading 6 reams note paper .....	.....	20 16
E. M. Lewis.....	1 burning brand.....	.....	1 50
H. C. Deming	Newspapers, 1st session 39th Congress.....	.....	50 00
A. Brandegee.....	do.....do.....	.....	50 00
J. A. Bingham	do.....do.....	.....	36 00
H. J. Raymond.....	New York Times to W. B. Washburne, 4 months and 20 days	4 00	
	New York Times to Roswell Hart, from December 12 to April 6	2 50	
			6 50
Hudson Taylor	29,000 speech envelopes	113 10	
	25,500 speech envelopes	99 45	
	48,000 speech envelopes	187 20	
	24,000 speech envelopes	93 60	
	24,000 document envelopes.....	91 68	
	22,500 document envelopes.....	85 90	
	30,000 document envelopes.....	114 60	
	40 reams letter paper.....	236 00	
			1,021 58
Augustus Brandegee	Stationery, 1st session 39th Congress .....	.....	67 24
H. C. Deming	do.....do.....	.....	60 88
Campbell & Sons.....	Closet lock and 2 brass drawer locks.....	3 00	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
Campbell & Sons—Continued	Set fire-irons and fender	\$22 50	
	12 papers tacks, 1 dozen sc. eyes, and 3 keys	1 70	
	2 cupboard (extra) keys	3 10	
	7½ pounds sheet brass	4 71	
	3 papers 20-ounce tacks and 1 padlock	1 70	
	1 pound copper tacks and 1 punch	1 50	
	6 sets castors, assorted	6 38	
	8 pounds nails and 15 set-files	4 70	
	1 oil-stone and 6 gross screws	5 40	
	1 butcher knife and 1 pound copper tacks	3 15	
	1 paper tacks and 1 rubber door-spring	60	
	6 awls and handles, 2 papers cloats, 1 fender, and 1 pair dogs	15 90	
	2 padlocks, 1 cupboard lock, and 1 dozen coat-hooks	4 35	
	6 blanks, 1 drawer lock, and 1 hatchet	2 75	
	1 cupboard lock and 21 pounds brass	14 40	
	3 dozen hooks and eyes and 2 dozen blank keys	5 25	
	1 poker, 1 shovel, and 2 pairs fine locks	1 65	
	1 night-latch, 1 dead-lock, and 2 keys	3 50	
	Charges on 30 bales matting from Philadelphia		\$106 24
S. F. Aldrich	Services as clerk to Committee on Coinage, Weights, and Measures, from April 16 to May 14, 1866		24 00
H. A. Newton	Services as clerk to Committee on Coinage, Weights, and Measures, from April 16 to May 14, 1866, extra, \$2 per day		112 00
H. A. Newton	New York Times furnished to A. Thornton, 3 months and 24 days		56 00
H. J. Raymond	1 oiled walnut desk		3 30
D. R. & S. D. Sage	10 complete sets, 68 volumes each, Congressional Globe and Appendix, 680 volumes, at \$5		58 00
F. & J. Rives	Stationery, 1st session 39th Congress		3,400 00
H. T. Blow	Services as clerk to Committee on War Debts of Loyal States, from May 1 to 20, 1866		56 51
R. C. Walker	Services as clerk to Committee on Military Affairs, May, 1866		80 00
W. H. McCartney	2 plumbers and 2 assistants, 2 days		124 00
E. Z. Steever	1 plumber and 1 assistant, 1 day	28 00	
	1 portable drop-light, with argand burner	7 00	
	2½ globe valves	16 00	
	4½ nipples and fittings	10 00	
		2 00	

1 steam fitter and 1 assistant, 2 days	14 00	
32 pounds 2-inch lead pipe.....	5 76	
2 2-inch unions and washer	6 00	
8 pounds solder	4 80	
Putty, plaster of Paris, and cement	2 75	
2 plumbers and assistants, 3 days.....	36 00	
2 plumbers and assistants, 1 day.....	12 00	144 31
Witness before committee on Provost Marshal General's Office	12 00	
Travel from Marshall, Michigan	150 40	162 40
Witness before committee on Provost Marshal General's Office.....	6 00	
Travel from Boonville, New York	102 60	
Cartage in May, —, of 155 loads of documents .....	.....	108 60
Cincinnati Gazette.....	.....	77 50
6 gross Mount Eagle Tripoli	34 00	6 00
Charges for freight.....	1 75	
Use of 1 horse and wagon for May, 1866.....	77 50	35 75
Use of 1 saddle-horse for May, 1866.....	62 00	
Use of 3 horses and wagons for May, 1866.....	.....	139 50
Temporary clerk, pay-roll for May, 1866	150 00	232 50
do.....do.....	150 00	
do.....do.....	150 00	
do.....do.....	125 00	
do.....do.....	125 00	
do.....do.....	125 00	
Clerk to Committee of Elections, May, 1866 .....	.....	800 00
Clerk to Committee on Accounts, May, 1866.....	.....	124 00
Clerk to Committee on the Judiciary, May, 1866.....	.....	124 00
Clerk to Committee for the District of Columbia, May, 1866 .....	.....	124 00
Engineer, pay-roll for May, 1866.....	125 00	124 00
do.....do.....	100 00	
do.....do.....	100 00	
do.....do.....	100 00	
do.....do.....	62 00	
do.....do.....	62 00	
do.....do.....	62 00	
do.....do.....	62 00	
Clinton Lloyd.....	.....	
William Averill.....	.....	
A. J. Larnier.....	.....	
V. Pulizzi.....	.....	
Judson Holcomb .....	.....	
E. Cowan.....	.....	
Walter W. Chase .....	.....	
D. W. Bartlett.....	.....	
S. D. Lord .....	.....	
E. G. Bowdoin .....	.....	
Edwin Stevens .....	.....	
J. D. Forney .....	.....	
J. H. Knox.....	.....	
W. B. Turner.....	.....	
H. S. Linker.....	.....	
J. H. Barker.....	.....	
C. P. Bundick .....	.....	
William Hutchinson .....	.....	
W. H. Beader .....	.....	
G. W. Smith .....	.....	
J. B. Clark, jr .....	.....	
E. T. Kidd .....	.....	
Hatch, Hardy & Co .....	.....	
Ira Goodnow.....	.....	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. H. Garges	Engineer, pay-roll for May, 1866.....	\$62 00	\$735 00
S. A. Wilkins.....	do.....do.....	62 00	
John T. Johnson	Laborer, pay-roll for May, 1866	55 80	840 10
Lewis Saunders	do.....do.....	55 80	
Alfred Dade.....	do.....do.....	55 80	
Thomas King	do.....do.....	55 80	
Henry Hall	do.....do.....	55 80	
Thomas P. Bell.....	do.....do.....	55 80	
John W. Lee.....	do.....do.....	55 80	
L. Cartwright	do.....do.....	55 80	
W. A. Duckett.....	do.....do.....	55 80	
Alexander Bruce	do.....do.....	55 80	
William Twine	do.....do.....	55 80	
Sandy Bruce, jr	do.....do.....	46 50	
Aaron Russell	do.....do.....	62 00	
Aquilla Hall	do.....do.....	62 00	
Henry Edwards	Laborer, (temporary,) pay-roll for May, 1866	6 00	46 50
Nelson Carter	do.....do.....	6 00	
Andrew Day	do.....do.....	6 00	
F. Wood.....	do.....do.....	6 00	
L. Williams	do.....do.....	6 00	
A. Fisher	do.....do.....	6 00	
P. Granton	do.....do.....	6 00	
R. Granger	do.....do.....	4 50	
Mrs. J. D. Ward	Services as watcher, and for keeping fires under folding-room for May, 1866	46 50	93 00
W. B. Atkinson	Page, pay-roll for May, 1866.....	62 00	
William Chaplin.....	do.....do.....	62 00	
P. McDevitt	do.....do.....	62 00	
J. R. Davis.....	do.....do.....	62 00	
Joseph Dyas	do.....do.....	62 00	93 00
William Hill	do.....do.....	62 00	

W. D. Lanston	do.....do.....	62 00	
Frank W. Larner	do.....do.....	62 00	
E. Merritt.....	do.....do.....	62 00	
William E. Newman	do.....do.....	62 00	
Sid. H. Nealy.....	do.....do.....	62 00	
John Ogler.....	do.....do.....	62 00	
A. S. Pillsbury.....	do.....do.....	62 00	
W. C. Raymond	do.....do.....	62 00	
Theo. Slater.....	do.....do.....	62 00	
Henry Stewart	do.....do.....	62 00	
R. E. Stevens.....	do.....do.....	62 00	
H. C. Wall.....	do.....do.....	62 00	
E. H. Willard	do.....do.....	62 00	
C. G. Burlingame	Riding page, pay-roll for May, 1866		1,240 00
F. P. James	do.....do.....	62 00	
Austin Gardner.....	do.....do.....	62 00	
William E. Dean	Temporary mail boys, pay-roll for May, 1866	75 00	
B. M. Van Kuren.....	do.....do.....	75 00	186 00
C. E. T. Bailey	Page in office of House of Representatives for May, 1866		150 00
B. G. Wheeler.....	Furniture, pay-roll for May, 1866	100 00	62 00
Joseph Reese.....	Furniture, pay-roll for May, 1866		250 00
V. E. Smally.....	Clerk to Committee on Military Affairs, May, 1866		186 00
John L. Swift.....	Clerk to Committee on Foreign Affairs, May, 1866		124 00
A. S. Perham	Clerk to Committee on Invalid Pensions, May, 1866		124 00
J. H. Reilly	Clerk to Committee on Mines and Mining, May, 1866		124 00
J. A. McKean.....	Clerk to Committee on Commerce, May, 1866		124 00
J. Matly.....	Clerk to Committee on Indian Affairs, May, 1866		124 00
F. & J. Rives.....	Reporting in publishing proceedings of the House of Representatives in the Daily Globe, during the month of May, 1866, 501 $\frac{54}{100}$ columns, at \$7 50 per column		3,759 46
William H. Smith.....	Services as messenger in House library, May, 1866		77 50
Ira Goodnow.....	900 street car tickets for the use of House of Representatives, April and May, 1866		54 00
William Twine	Washing 19 $\frac{1}{2}$ dozen towels in May, 1866, at 50 cents per dozen		9 54
R. J. Stevens	Clerk to Committee on Appropriations, May, 1866		180 00
L. L. Crouse.....	Clerk to Committee on Banking and Currency, April and May, 1866		244 00
Ezra Davol.....	Clerk to Committee on Freedmen, May, 1866		124 00
E. L. Chapman.....	Clerk to Committee on Territories		124 00
E. Z. Steever.....	29 pounds lead pipe.....	5 22	

A.—Detailed statement of disbursements, &c.—Continued.

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
E. Z. Steever—Continued.....	8 pounds solder.....	\$4 80	\$289 33
	2 plumbers and assistant, 1 day	12 00	310 00
	3 portable drop lights.....	36 00	46 50
	2 plumbers and assistant, 1 day	12 00	96 17
	4 pounds putty, 50 new washers.....	4 00	56 25
	25 pounds lead pipe.....	4 50	50 00
	9 pounds solder.....	5 40	50 00
	2 plumbers, 1 day.....	10 00	50 00
	25½ pounds new lead pipe.....	4 59	66 85
	9 pounds solder.....	5 40	46 19
	New washers and new couplings for basins.....	3 50	19 50
	1 marble washbasin, plaster of Paris.....	5 75	
	2 plumbers and assistant, 1 day.....	12 00	
	1 isinglass shade, protector, and frame.....	1 50	
	Copper wire, with sheet lead, putty, &c.....	4 50	
	2 plumbers and assistant, 1 day	12 00	
	78 feet gallon water pipe.....	50 70	
	2 brass globe valves, fittings.....	12 40	
	Pipe hooks, nipples, unions.....	5 25	
	29 pounds lead pipe, and 8 pounds solder.....	10 02	
	2 lock nuts and washers, 1 best five-inch hose.....	9 00	
	Running threads and red lead, 1 iron sink, with legs.....	11 00	
	2 plumbers and assistant, 4 days.....	48 00	
T. A. Beaton.....	4 horses and carriages for carrying mail during the month of May, 1866, at \$10 per day.....		
H. P. Phishe.....	Services in Ladies' retiring room for May, 1866.....		
Kitty Bruce.....	Washing 192½ dozen towels in May, 1866, at 50 cents per dozen.....		
A. Grages.....	75 pounds tobacco, at 75 cents per pound.....		
L. S. Trimble.....	Newspapers, 1st session 39th Congress.....		
G. W. Anderson.....	Newspapers, 1st session 39th Congress.....		
William H. Hooper.....	Newspapers, 1st session 39th Congress.....		
Philip Johnson.....	Stationery, 1st session 39th Congress.....		
John A. Bingham.....	Stationery, 1st session 39th Congress.....		
Adams Express Company.....	Charges on 6 boxes ink.....		

Folder, pay-roll for May, 1866.		
Joseph S. Reed.....	do.....	100 00
J. Simons.....	do.....	100 00
T. Blague.....	do.....	100 00
J. Sterling.....	do.....	100 00
J. T. Chauncey.....	do.....	100 00
T. M. Kellinger.....	do.....	93 00
W. G. Brower.....	do.....	93 00
J. M. Shomo.....	do.....	93 00
A. H. Walcott.....	do.....	93 00
John Dwyer.....	do.....	93 00
P. Ward.....	do.....	93 00
O. Peabody.....	do.....	93 00
B. Thomas.....	do.....	93 00
De Witt C. Lewis.....	do.....	93 00
H. Weaver.....	do.....	93 00
F. Irwin.....	do.....	93 00
S. Ten Eyck.....	do.....	93 00
E. P. Ferris.....	do.....	93 00
P. H. Griswold.....	do.....	93 00
E. W. Morse.....	do.....	93 00
E. Tuck.....	do.....	93 00
J. E. Hammond.....	do.....	93 00
D. A. Hull.....	do.....	93 00
J. William Pope.....	do.....	93 00
H. W. McGeorge.....	do.....	93 00
Joseph L. McKie.....	do.....	93 00
B. D. Peck.....	do.....	93 00
J. W. Pettit.....	do.....	93 00
W. S. Young.....	do.....	93 00
William Small.....	do.....	93 00
William H. Boughter.....	do.....	93 00
William R. Smith.....	do.....	93 00
William Davis.....	do.....	93 00
Henry C. Sherrill.....	do.....	93 00
C. W. Linthurst.....	do.....	93 00
S. S. Strachan.....	do.....	93 00
William Cunningham.....	do.....	93 00
Benjamin Ross.....	do.....	93 00
H. Z. Knapp.....	do.....	93 00
George F. Colby.....	do.....	93 00
L. Bess.....	do.....	93 00

A.—Detailed statement of disbursements, &c.—Continued.

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
S. Malcomb.....	Folder, pay-roll for May, 1866.....	\$93 00	\$4,805 90
William Moran.....	do.....	93 00	
Julius De Sauls.....	do.....	77 50	
C. F. Rowe.....	do.....	77 50	
M. Flaherty.....	do.....	62 00	
C. D. Choate.....	do.....	62 00	
P. B. Prince.....	do.....	62 00	
S. Stelle.....	do.....	62 00	
H. Baldwin.....	do.....	62 00	
G. H. Schidmore.....	do.....	62 00	
E. McConnell.....	do.....	62 00	
Thomas Martin.....	do.....	55 80	
P. Nolan.....	do.....	55 80	
R. Watkins.....	do.....	55 80	
C. Stebbins.....	do.....	100 00	886 00
A. J. Morey.....	do.....	100 00	
S. G. Bugh.....	do.....	100 00	
J. W. Nightingale.....	do.....	100 00	
H. W. Morrison.....	do.....	100 00	
H. M. Maguire.....	do.....	100 00	
P. H. Reinhard.....	do.....	100 00	
Paul Stevens.....	do.....	93 00	
William Dalton.....	do.....	93 00	
Otto Garges.....	do.....	3 85	
Edward Peck.....	do.....	27 38	
C. Young.....	do.....	10 10	
G. Prince.....	do.....	35 70	
A. Shaw.....	do.....	40 92	
J. Knarl.....	do.....	15 50	
J. Dailey.....	do.....	18 27	
O. Shomo.....	do.....	25 15	
H. Whitefoot.....	do.....	23 95	

F. Butterbaugh.....	do.....	do.....	20 97
A. Bradshaw.....	do.....	do.....	19 28
C. Wincher.....	do.....	do.....	29 83
J. Harris.....	do.....	do.....	23 92
William Langston.....	do.....	do.....	21 96
William Bradford.....	do.....	do.....	22 57
C. Roe.....	do.....	do.....	17 15
William Tabler.....	do.....	do.....	18 91
J. Lambert.....	do.....	do.....	21 79
C. L. Laver.....	do.....	do.....	17 95
O. Hugueley.....	do.....	do.....	28 82
N. Carr.....	do.....	do.....	20 92
T. Sheets.....	do.....	do.....	16 65
G. Clift.....	do.....	do.....	11 40
Thomas Tippetts.....	do.....	do.....	18 05
S. C. Stailey.....	do.....	do.....	14 65
J. Wilkinson.....	do.....	do.....	18 00
William Dulin.....	do.....	do.....	18 39
C. E. Gibson.....	do.....	do.....	30 62
C. Lochery.....	do.....	do.....	3 12
			595 77
C. Deane.....	276 pounds fine twine.....		241 50
	471 pounds coarse twine.....		211 95
			453 45
J. W. Boteler & Brother.....	2 dozen baskets.....		38 00
	1 rack.....		1 00
	1 dozen clothes brushes.....		12 00
	1 dozen hat brushes.....		12 00
	2 dozen whisk brushes.....		12 00
	11 gross matches.....		44 00
	6 dozen tumblers.....		22 50
	1 dozen spittoons.....		12 00
	$\frac{1}{2}$ dozen large pitchers.....		10 50
	2 plated ice pitchers.....		42 00
	2 dozen brooms.....		18 00
	2 dozen chamois skins.....		24 00
	2 dozen nail brushes.....		24 00
	2 dozen buckets.....		12 00
	8 baskets.....		36 00
			320 00

CONTINGENT EXPENSES OF

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
T. T. Fowler & Co.....	13,653 pounds ice, March, 1866; 14,562 pounds of ice, April 1866, at 75 cents.....	.....	\$211 62
Joseph J. May & Co.....	4 dozen large bath towels.....	\$72 00	
	2 dozen large bath towels.....	16 00	
	6 dozen damask towels.....	90 00	
			178 00
T. T. Fowler & Co.....	17,833 pounds ice, May, 1866, at 75 cents.....	.....	134 13
A. P. Davis.....	Temporary clerk office Sergeant-at-arms, May, 1866.....	.....	125 00
Philp & Solomons.....	Altering to 1862 from 1863.....	.....	
	1 blank book.....	1 00	
	18 reams flat cap paper.....	2 50	
	4 dozen barometer inks.....	118 80	
	2 dozen Arnold's, quarts, ink.....	59 00	
	2 dozen Arnold's, pints, ink.....	12 34	
	2 dozen Arnold's, $\frac{1}{2}$ pints, ink.....	7 14	
	6 dozen French carmine ink.....	3 90	
	2 dozen rubber and gold propelling pencils.....	9 00	
	2 dozen rubber and gold propelling pencils.....	38 00	
	$\frac{1}{2}$ dozen silver patent propelling pencils.....	41 80	
	$\frac{1}{2}$ dozen silver patent propelling pencils.....	10 00	
	$\frac{1}{2}$ dozen gold patent propelling pencils.....	10 80	
	$\frac{1}{2}$ dozen gold patent propelling pencils.....	24 37	
	$\frac{1}{2}$ dozen gold patent propelling pencils.....	30 00	
	$\frac{1}{2}$ dozen gold and rubber pens and pencils.....	22 34	
	$1\frac{1}{2}$ dozen gold and rubber pens and pencils.....	74 65	
	2 dozen gold and rubber pens and pencils.....	121 34	
	1 dozen gold and rubber tel. and pencil.....	66 00	
	4 cases gold pens and pencils.....	55 00	
	4 cases gold pens and pencils.....	55 00	
	4 cases gold pens and pencils.....	80 00	
	15 dozen 8 ounce mucilage.....	78 75	
	12 paper weights.....	20 40	
	12 paper weights.....	23 04	
	12 dozen cut quills, boxes.....	76 56	
	$\frac{1}{2}$ dozen pocket-books.....	6 48	
	$\frac{1}{2}$ dozen pocket-books.....	9 36	

1 dozen pocket-books	8 28
1 dozen pocket-books	15 54
1 dozen pocket-books	7 56
1 dozen pocket-books	10 80
1 dozen pocket-books	15 72
1 dozen pocket-books	9 24
1 dozen pocket-books	6 12
1 dozen pocket-books	10 50
3 pocket-books	5 24
2 pocket-books	5 20
2 pocket-books	6 74
2 pocket-books	7 00
2 pocket-books	7 50
83 pounds wax	145 25
3 dozen extra wide Congress folders	28 80
2 dozen fancy Congress folders	17 94
2 dozen 9-inch Congress folders	34 20
2 dozen Congress folders	31 50
1 dozen medium quarto blank books	26 40
1 dozen quarto blank books	21 12
1 dozen memorandums	4 44
2 dozen memorandums	7 92
1 dozen memorandums	3 96
1 dozen memorandums	3 72
2 dozen memorandums	6 48
1 dozen memorandums	15 12
1 dozen memorandums	4 68
2 dozen memorandums	23 76
1 dozen memorandums	10 08
1 dozen memorandums	5 04
2 gross rubber bands	4 50
2 gross rubber bands	6 50
2 gross rubber bands	4 50
3 gross rubber bands	5 25
2 gross rubber bands	2 25
3 gross rubber bands	5 25
2 gross rings, heavy 3-inch	2 00
2 gross rings, heavy 3-inch	4 00
2 gross rings, heavy 3-inch	2 50
1 gross rings, light	1 75
2 gross rings, light	4 00

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
Philp & Solomons—Continued			
	1 great gross rings, No. 50.....	\$4 50	
	1 great gross rings, No. 11.....	1 50	
	2 dozen eyelet machines.....	19 00	
	2 dozen punches.....	17 00	
	4 dozen melanograph ink.....	16 00	
	4 dozen melanograph ink.....	10 00	
	4 dozen melanograph ink.....	6 00	
	3 portfolios.....	16 50	
	3 portfolios.....	15 99	
	3 portfolios.....	18 00	
	3 portfolios.....	25 50	
	6 portfolios.....	11 22	
	6 portfolios.....	13 68	
	6 Rodger's knives.....	30 00	
	6 Rodger's knives.....	27 00	
	6 Rodger's knives.....	30 00	
	6 Wostenholme's knives.....	48 00	
	6 Wostenholme's knives.....	41 04	
	6 Wostenholme's knives.....	46 50	
	6 Wostenholme's knives.....	48 60	
	6 Wostenholme's knives.....	51 00	
	6 Wostenholme's knives.....	36 00	
	6 Wostenholme's knives.....	22 50	
	6 Wostenholme's knives.....	20 40	
	6 Wostenholme's knives.....	25 50	
	12 Wostenholme's knives.....	72 00	
	6 Wostenholme's knives.....	21 00	
	4 Wostenholme's knives.....	36 00	
	6 Wostenholme's knives.....	14 88	
	6 Wostenholme's knives.....	15 00	
	6 Wostenholme's knives.....	18 60	
	5 Wostenholme's knives.....	28 75	
	6 cases scissors.....	19 44	
	6 sets scissors.....	34 38	

2 dozen scissors	29 96	
3 pocket-books	6 00	
2 pocket-books	4 80	
12 paper-weights	8 40	
8 paper-weights	10 80	
7,000 white envelopes	468 00	
10 reams legal cap	77 00	
5 dozen packs visiting cards	12 65	
9 reams ruled cap	60 93	
1 set scissors	2 98	
1 set scissors	3 24	
1 set scissors	5 73	
1 set scissors	2 76	
10 dozen packs visiting cards	28 00	
1 die with handle	7 50	
1 ream cap	9 00	
50 reams commercial note paper	148 50	
24 pairs scissors	9 12	
21 pairs scissors	17 22	
1 knife	5 75	
25,000 envelopes	156 00	
76,000 envelopes	275 88	
65 boxes for steel pens	3 90	
131,000 envelopes	475 53	
1,000 envelopes	25 00	
12 quires cap to manuscript books	16 44	
	4,336 34	
Dempsey & O'Toole	87 50	
10 gross hexagon pencils	36 00	
1 gross glass inkstands		123 50
W. S. Mitchell & Co	861 10	
229½ yards Brussels carpet	6 00	
6 pieces binding	17 50	
7 pounds thread	240 00	
40 yards green plush	18 00	
72 yards scroll gimp	4 50	
1 piece red gimp	30	
2 papers needles	1 00	
10 spools silk	1 25	
10 spools cotton	4 50	
1 piece green gimp	30	
3 skeins silk		

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
W. S. Mitchell & Co—Cont'd .	1 piece gimp	\$4 50	
	3 pounds thread	7 50	
	8 yards 4-4 Brussels carpet	24 00	
	1 yard curtain bordering	1 25	
	25 yards blue cloth	156 25	
	2 yards silk cord	1 00	
	5 yards blue cloth	31 25	
	12 yards extra enamelled cloth	21 00	
	22 yards fine cocoa matting	33 00	
	16½ yards blue cloth	92 81	
	24 yards best oilcloth	48 00	
	10 yards gimp	1 50	
	30 yards wide shade Holland	37 50	
	9 rollers and slats	2 70	
	72 yards cord	5 76	
	9 tassels	2 25	
	1 pulley	25	
	11 yards green English cloth	15 00	
	6½ yards wide shade Holland	8 13	
	2 tassels	50	
	2 cocoa mats	13 50	
	148 yards carpeting	407 00	
	1 cocoa mat	9 00	
	1 yard silicia	75	
	18 yards bordered reps	90 00	
	36 yards silicia	25 20	
	2 sets tassels and cords	32 00	
	2 cocoa mats	18 00	
	2 spools cotton	25	
	20 yards oilcloth	45 00	
	12 yards extra enamelled cloth	21 00	
Credit by 4 yards plush returned		2,314 80	
		24 00	
			\$2,290 80

J. H. Orne & Co	1,200 yards 4-4 white matting	900 00	927 50
	5 gross binding	27 50	
J. R. Hunt	1 chest	7 00	
	1 chest	6 00	
	1 chest	10 00	
	1 chest	5 00	
	Repairing 2 chairs	1 50	
	Repairing stable	11 50	
	1 pole	1 00	
	2 mops	2 00	
	1 extra box	5 00	
	107 boxes	304 50	
	14 Congressional Globe boxes	49 00	
	4 ventilators	1 50	
	Repairing 7 desks	3 50	
	35 feet walnut carpet strips	2 80	
	Work done in hall	50 75	
	Walnut file case	15 00	
	Hanging sash	1 50	
	Case of pigeon holes	16 50	
	1 letter press, stand, and closet	10 00	
	Repairing chair	1 25	
	Repairing sash	1 00	
	Repairing door	50	
F. & J. Rives	4,780 copies, volume 3, Congressional Globe and Appendix for 1st session 39th Congress, being 24 copies each for 186 members and delegates and 100 copies for the House library; 4,780 volumes, at \$2 80 per volume	576 80	
U. H. Painter	Clerk to Committee on the Post Office and Post Roads, May, 1866	13,384 00	
Mary C. Moores	53 buckets paste furnished in May, 1866, at \$1 50	124 00	
Thomas A. Beaton	Hauling 1,259 loads of documents during May, 1866, at 50c	79 50	
M. V. Throop	Printing 60 sheets parchment, at 33c	629 50	
L. King	Attendance as a witness before Committee on Agriculture, 3 days, at \$2	19 80	
	36 miles travel	6 00	
		3 60	
Frank Taylor	Almanach de Gotha, 1866	2 75	
	2 British almanacs and compendium, 1866	4 80	
Ezekiel Young	Twenty per cent. additional on salary, 1st session 38th Congress, from December 7 to 14, 1866	7 55	
George W. Nokes	Painting sign on Sergeant-at-arms' door	5 10	
		5 00	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
George W. Nokes—Continued	Painting sign on Elections Committee's door	\$5 00	
	Painting sign on Claims Committee's door	5 00	
	Putting in 4 lights of glass in post office, at \$1 25	5 00	
Henry F. Baker	Clerk to Committee on the Militia, May 1 to June 4, 1866		\$20 00
Ezra Davol	Clerk to Committee on Freedmen's Affairs, June, 1866		140 00
Philp & Solomons	150,000 speech envelopes		120 00
	171,000 speech envelopes	544 50	
	205,000 speech envelopes	620 73	
	59,000 speech envelopes	744 15	
	109,000 speech envelopes	214 17	
		395 67	
N. G. Ordway	1 horse and carriage, April and May, 1866		2,519 22
Ira Goodnow	1 horse and wagon, June, 1866	75 00	152 50
	1 saddle-horse	60 00	
Charles Follet	Time spent and expenses incurred in contesting seat of Hon. C. Delano		135 00
N. G. Ordway	Arresting, &c., the following-named members of the House, on February 10, 1865, on a call of the House:		1,500 00
	J. C. Allen	3 20	
	William J. Allen	3 20	
	W. A. Hutchins	3 20	
	J. B. Alley	3 20	
	L. Anderson	3 20	
	J. N. Arnold	3 20	
	G. Bliss	3 20	
	H. T. Blow	3 20	
	J. Brooks	3 20	
	J. M. Ashley	3 20	
	J. Bailey	3 20	
	J. B. Blair	3 20	
	W. G. Brown	3 20	
	J. W. Chanler	3 20	
	F. Clark	3 20	

B. J. Clay.....	3 20
I. C. Sloan.....	3 20
R. P. Spaulding.....	3 20
J. B. Steele.....	3 20
W. G. Steele.....	3 20
J. T. Stuart.....	3 20
L. D. M. Sweat.....	3 20
R. B. Van Valkenburgh.....	3 20
E. H. Webster.....	3 20
E. Wheeler.....	3 20
B. Wood.....	3 20
F. Wood.....	3 20
G. H. Yeaman.....	3 20
A. A. King.....	3 20
A. L. Knapp.....	3 20
F. C. Le Blond.....	3 20
R. Mallory.....	3 20
D. Marcy.....	3 20
A. McAllister.....	3 20
W. H. Miller.....	3 20
W. P. Noble.....	3 20
J. O. Norton.....	3 20
G. S. Orth.....	3 20
N. Perry.....	3 20
F. A. Pike.....	3 20
H. Price.....	3 20
W. H. Randall.....	3 20
A. H. Rice.....	3 20
J. C. Robinson.....	3 20
A. J. Rogers.....	3 20
E. H. Rollins.....	3 20
James S. Rollins.....	3 20
R. C. Schenck.....	3 20
J. G. Scott.....	3 20
H. L. Dawes.....	3 20
J. L. Dawson.....	3 20
N. F. Dixon.....	3 20
J. Donnelly.....	3 20
J. R. Eden.....	3 20
J. K. Edgerton.....	3 20
J. E. English.....	3 20

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
N. G. Ordway—Continued . . .	Arresting, &c., the following-named members of the House, on February 10, 1865, on a call of the House:		
	John Ganson	\$3 20	
	J. F. Farnsworth	3 20	
	A. Frank	3 20	
	A. Harding	3 20	
	H. W. Harrington	3 20	
	B. G. Harris	3 20	
	A. Herrick	3 20	
	F. W. Kellogg	3 20	
S. F. Hourd	Witness before committee on Provost Marshal General's Office, 7 days, at \$2.	14 00	\$204 80
	1,684 miles' travel, at 10c	168 40	
Joseph Buffington	Witness before Committee on Banking and Currency, 1 day	2 00	182 40
	1,684 miles' travel	168 40	
Peter B. Crandall	Witness before committee on Provost Marshal General's Office, 33 days	66 00	170 40
	1,000 miles' travel	100 00	
S. Hubbard	Witness before committee on Provost Marshal General's Office, 33 days	66 00	166 00
	972 miles' travel	97 20	
N. G. Ordway	Amount paid for telegrams, Committee on Commerce:		163 20
	L. C. Baker	5 49	
	J. H. Maddox	5 88	
	H. W. Ladd	10 09	
	D. R. Martin	3 52	
	E. Pierpont	75	
	E. B. Washburne	13 44	
	G. N. Lane	1 00	
	J. B. McPhail	4 55	
	G. W. Quintan	2 97	
	Cash for use of committee	100 00	
	T. C. Durant	8 17	

George H. Johnson	13 40	
Deduct amount refunded by Mr. Washburne.....	169 26 19 00	150 26
Witness before committee on Provost Marshal General's Office, 25 days	50 00	
972 miles' travel	97 20	147 20
Witness before committee on Provost Marshal General's Office, 14 days	28 00	
964 miles' travel	96 40	124 40
Witness before committee on Provost Marshal General's Office, 14 days	28 00	
964 miles' travel	96 40	124 40
Witness before committee on Provost Marshal General's Office, 1,180 miles travel .....	.....	118 00
Witness before committee on Provost Marshal General's Office, 6 days	12 00	
956 miles' travel	95 60	107 60
Witness before committee on Provost Marshal General's Office, 3 days	6 00	
956 miles' travel	95 60	101 60
Witness before committee on Provost Marshal General's Office, 3 days	6 00	
956 miles' travel	95 60	101 60
Witness before committee on Provost Marshal General's Office, 2 days	4 00	
956 miles' travel	95 60	99 60
Twenty per cent. additional on salary, 1st session 39th Congress .....	.....	82 00
Witness before committee on Provost Marshal General's Office, 14 days	28 00	
452 miles' travel	45 20	73 20
Witness before committee on Provost Marshal General's Office, 3 days	6 00	
452 miles' travel	45 20	51 20
Witness before committee on Provost Marshal General's Office, 3 days	6 00	
452 miles' travel	45 20	51 20
Witness before committee on Provost Marshal General's Office, 3 days	6 00	
452 miles' travel	45 20	51 20

CONTINGENT EXPENSES OF

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
William Dunning.....	Witness before committee on Provost Marshal General's Office, 3 days	\$6 00	
	452 miles' travel	45 20	\$51 20
George Elder.....	Witness before committee on Provost Marshal General's Office, 3 days	6 00	
	452 miles' travel	45 20	51 20
C. H. Trask	Witness before committee on Provost Marshal General's Office, 3 days	6 00	
	452 miles' travel	45 20	51 20
J. Setley	Witness before committee on Provost Marshal General's Office, 3 days	6 00	
	452 miles' travel	45 20	51 20
B. F. Tracy	Witness before committee on Provost Marshal General's Office, 2 days	4 00	
	470 miles' travel	47 00	51 00
William Hepburn.....	Witness before committee on Provost Marshal General's Office, 2 days	4 00	
	452 miles' travel	45 20	49 20
S. Shook.....	Witness before committee on Provost Marshal General's Office, 1 day	2 00	
	452 miles' travel	45 20	47 20
J. W. Booth	Witness before committee on Provost Marshal General's Office, 1 day	2 00	
	452 miles' travel	45 20	47 20
J. A. Kennedy.....	Witness before committee on Provost Marshal General's Office, 1 day	2 00	
	460 miles' travel	46 00	48 00
M. F. Odell.....	Witness before Committee on Agriculture, 2 days	4 00	
	300 miles' travel	30 00	34 00
W. R. Elwell	Witness before Committee on Agriculture, 2 days	4 00	
	286 miles' travel	28 60	32 60

M. L. De Coursey	Witness before committee on Provost Marshal General's Office, 2 days	4 00	32 00
N. G. Ordway	280 miles travel	28 00	
	Serving subpoenas on the following named witnesses before the Committee on the District of Columbia:		
	M. L. Giberson, J. H. Johnson	4 40	
	B. F. Bevenger, George Tayman	4 40	
	J. Bell, A. Duval	4 40	
	Mr. Ross, A. W. Middleton	4 40	
	Thomas Parker, George Parker	4 40	
	Thomas R. Wilson, M. Thompson	4 40	
	E. J. Middleton	2 20	
J. A. Hopkins	Witness before Committee on Agriculture, 6 days	12 00	28 60
	2 miles travel	20	
L. H. Babcock	Witness before Committee on Provost Marshal General's Office, 4 days		12 20
James Moore	Witness before Committee on Agriculture, 1 day	2 00	8 00
	2 miles travel	20	
D. C. McRuer	Newspapers, 1st session 39th Congress		2 20
J. H. Defrees	do		50 00
J. Baker	do		50 00
N. F. Dixon	do		50 00
J. Lynch	do		50 00
J. H. Ketchum	do		50 00
T. G. Bergen	do		50 00
S. Tabor	do		50 00
B. Eggleston	do		50 00
R. B. Hays	do		50 00
William Radford	do		50 00
G. R. Latham	do		50 00
C. D. Hubbard	do		50 00
A. Harding	do		50 00
S. Perham	do		50 00
S. Hooper	do		50 00
J. H. Rice	do		50 00
J. H. D. Henderson	do		50 00
A. J. Kuykendall	do		50 00
T. A. Jenckes	do		50 00
F. C. LeBlond	do		50 00

CONTINGENT EXPENSES OF

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
B. F. Loan	Newspapers, 1st session 39th Congress.....	.....	\$50 00
G. Marston	do.....do.....	.....	50 00
J. K. Moorhead.....	do.....do.....	.....	50 00
A. C. Harding.....	do.....do.....	.....	50 00
J. Bidwell.....	do.....do.....	.....	50 00
C. A. Eldridge.....	do.....do.....	.....	50 00
J. H. Hubbard.....	do.....do.....	.....	50 00
B. C. Ritter.....	do.....do.....	.....	50 00
H. Van Aernan.....	do.....do.....	.....	50 00
F. A. Pike.....	do.....do.....	.....	50 00
H. Van Aernan.....	do.....do.....	.....	50 00
F. A. Pike.....	do.....do.....	.....	50 00
H. Van Aernan.....	do.....do.....	.....	50 00
T. D. Eliot.....	do.....do.....	.....	50 00
J. A. Kasson.....	do.....do.....	.....	50 00
C. O'Neill.....	do.....do.....	.....	50 00
S. F. Wilson.....	do.....do.....	.....	50 00
J. Wentworth.....	do.....do.....	.....	50 00
G. S. Orth.....	do.....do.....	.....	50 00
T. M. Pomeroy.....	do.....do.....	.....	45 00
J. Hogan.....	do.....do.....	.....	50 00
L. Myers.....	do.....do.....	.....	50 00
J. C. Sloan.....	do.....do.....	.....	50 00
R. C. Schenck.....	do.....do.....	.....	50 00
E. H. Rollins.....	do.....do.....	.....	50 00
H. E. Paine.....	do.....do.....	.....	50 00
G. L. Ordway.....	Page to Sergeant-at-arms for May.....	.....	62 00
Philp & Solomons.....	12,500 white envelopes.....	\$61 00	
	17 pounds wax.....	29 75	
	40 reams legal cap.....	308 00	
	7 reams flat cap.....	46 20	
	Printing from plate, 1 ream letter paper for Committee on Ways and Means.....	3 75	
	Printing from plate, 2 reams note paper for Committee on Ways and Means.....	7 50	
	22 pints French copying ink.....	27 50	
	1 blank book.....	4 50	

J. C. Sloan.....	Engraving plate heading, Clerk's office.....	8 00	602 20
J. G. Blaine.....	Engraving plate letter, Clerk's office.....	10 50	72 92
B. C. Ritter.....	6 dozen red and blue pencils.....	18 00	72 20
A. Harding.....	Stationery, 1st session 39th Congress.....		61 95
A. J. Kuykendall.....	do.....		61 71
W. E. Finck.....	do.....		61 71
W. H. Hooper.....	do.....		54 47
W. D. Wyvill.....	do.....		37 92
	Covering matting with zinc, and repairing.....		
	3 water pitchers.....	4 50	
	New bottom in bucket.....	1 50	
	Repairing pitcher and bottom.....	1 75	
	Repairing water-cooler, and repairing pitcher.....	1 50	
	1 Russia iron fender and lantern.....	3 50	
	22 pounds Russia iron casing and putting up same.....	18 00	
	1 lantern, 6 twine boxes.....	22 00	
		15 00	
W. B. Moses.....	2 oak cane seat stools.....	2 50	66 75
	4 oak cane seat stools.....	7 00	
S. L. Warner.....	Newspapers, 1st session 39th Congress.....		9 50
J. W. McClurg.....	do.....		50 00
V. E. Smalley.....	Clerk to Committee on Military Affairs, June.....		50 00
W. H. Townley.....	Clerk to Committee on Coinage, Weights, and Measures, from May 14 to 25.....		180 00
A. S. Perham.....	do.....		72 00
E. Stevens.....	do.....		120 00
E. G. Bowdoin.....	do.....		120 00
J. A. McKean.....	do.....		120 00
Samuel D. Lord.....	do.....		120 00
D. W. Bartlett.....	do.....		120 00
L. L. Crounse.....	do.....		120 00
John L. Swift.....	do.....		120 00
J. H. Kiley.....	do.....		120 00
J. Marty.....	do.....		120 00
U. H. Painter.....	do.....		120 00
James McQuade.....	do.....		120 00
	Witness before Committee on Provost Marshal General's Office, 8 days.....	16 00	
	956 miles travel.....	95 60	
			111 60

CONTINGENT EXPENSES OF

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
R. S. S. Andros	Witness before committee on Boston and New York custom-houses, 9 days 934 miles' travel	\$18 00 93 40	\$111 40
B. A. Clark	Witness before committee on Provost Marshal General's Office, 7 days 956 miles' travel	14 00 95 60	109 60
A. S. Herndon	Witness before committee on Provost Marshal General's Office, 7 days 956 miles' travel	14 00 95 60	109 60
Peter Clogher	Witness before committee on Provost Marshal General's Office, 3 days 956 miles' travel	6 00 95 60	101 60
J. D. Collins	Witness before committee on Provost Marshal General's Office, 1 day 956 miles' travel	2 00 95 60	97 60
E. Malloy	Witness before committee on Provost Marshal General's Office, 16 days 470 miles' travel	32 00 47 00	79 00
L. I. Weichman	Witness before Committee on the Judiciary, 6 days 280 miles' travel	12 00 28 00	40 00
William A. Rose	Witness before committee on Provost Marshal General's Office, 1 day 2 miles' travel	2 00 20	2 20
P. W. Hitchcock	Newspapers, 1st session 39th Congress .....	.....	50 00
A. J. Glossbrenner	do.....do .....	.....	48 75
William B. Washburn	do.....do .....	.....	39 75
R. S. Hale	do.....do .....	.....	38 00
Daniel Morris	Stationery, 1st session 39th Congress .....	.....	75 00
C. T. Hulburd	do.....do .....	.....	75 00
N. Taylor	do.....do .....	.....	74 90
J. A. Kasson	do.....do .....	.....	74 90
William D. Kelley	do.....do .....	.....	74 80
John D. Baldwin	do.....do .....	.....	72 68

S. E. Ancona.....	do.	do.	do.	72 42
J. M. Ashley.....	do.	do.	do.	71 65
William B. Washburn..	do.	do.	do.	71 02
G. S. Shanklin	do.	do.	do.	40 56
Samuel Hooper.....	do.	do.	do.	68 74
P. W. Hitchcock.....	do.	do.	do.	68 45
B. G. Harris	do.	do.	do.	68 21
T. T. Davis.....	do.	do.	do.	67 83
G. S. Boutwell.....	do.	do.	do.	67 27
William Radford.....	do.	do.	do.	65 85
Thomas Goodyear.....	do.	do.	do.	65 85
Thomas D. Eliot	do.	do.	do.	64 71
Roswell Hart.....	do.	do.	do.	64 43
T. M. Pomeroy.....	do.	do.	do.	64 35
T. G. Bergen.....	do.	do.	do.	64 25
J. A. Griswold.....	do.	do.	do.	63 86
S. Taber.....	do.	do.	do.	63 85
N. F. Dixon	do.	do.	do.	63 62
R. E. Trowbridge.....	do.	do.	do.	63 48
S. L. Warner.....	do.	do.	do.	63 25
H. McCullough.....	do.	do.	do.	62 17
F. C. Beaman.....	do.	do.	do.	61 55
A. W. Hubbard.....	do.	do.	do.	61 27
C. H. Winfield.....	do.	do.	do.	60 51
F. C. Le Blond.....	do.	do.	do.	60 24
A. S. Glossbrenner.....	do.	do.	do.	59 25
L. S. Trimble.....	do.	do.	do.	58 00
C. Upson.....	do.	do.	do.	57 32
C. Delano.....	do.	do.	do.	57 00
A. J. Rogers	do.	do.	do.	55 68
D. Hubbard, jr.....	do.	do.	do.	52 05
G. C. Smith.....	do.	do.	do.	51 72
J. K. Moorhead.....	do.	do.	do.	51 25
J. F. Benjamin.....	do.	do.	do.	50 89
J. N. Goodwin.....	do.	do.	do.	49 38
J. B. Grinnell.....	do.	do.	do.	49 40
M. C. Kerr.....	do.	do.	do.	49 16
R. W. Clark.....	do.	do.	do.	48 15
John Hogan.....	do.	do.	do.	47 94
A. A. Denny.....	do.	do.	do.	47 52
J. R. Hubbell.....	do.	do.	do.	47 00

A.—Detailed statement of disbursements, &c.—Continued.

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
R. S. Hale.....	Newspapers, 1st session 39th Congress.....	.....	\$46 65
J. M. Marvin.....	do.....do.....	.....	46 39
J. H. Hubbard.....	do.....do.....	.....	46 33
T. A. Plants.....	do.....do.....	.....	45 50
W. E. Niblack.....	do.....do.....	.....	43 02
S. M. Cullom.....	do.....do.....	.....	36 60
Samuel McKee.....	do.....do.....	.....	36 27
S. J. Randall.....	do.....do.....	.....	35 52
S. T. Holmes.....	do.....do.....	.....	33 17
H. S. Bundy.....	do.....do.....	.....	25 03
D. C. McRuer.....	do.....do.....	.....	22 72
M. R. Thayer.....	do.....do.....	.....	20 47
A. H. Coffroth.....	do.....do.....	.....	19 82
M. Strouse.....	do.....do.....	.....	16 78
J. R. Kelso.....	do.....do.....	.....	2 16
W. A. McCartney.....	Clerk to Committee on Naval Affairs, from June 1 to 11, 1866.....	.....	44 00
C. Dean.....	323 pounds flax twine.....	\$282 62	
	592 pounds twine.....	266 40	
C. Lloyd.....	Use of 3 horses and carriages for June, 1866, at \$2 50 per day.....	.....	549 02
N. G. Ordway.....	Use of 1 horse and carriage for June, 1866.....	.....	225 00
H. P. Phisk.....	Services in ladies' retiring-room in June, 1866.....	.....	75 00
N. G. Ordway.....	Expenses incurred in attending funeral of General Scott: Sleeping-cars, fires, and refreshments to New York and return.....	419 97	
	Hack hire and hotel bill at St. Nicholas Hotel.....	276 48	
	Hack hire and lunch at West Point.....	75 00	
	Fare from New York to West Point and return.....	42 00	
	Gloves, crape, and sashes for committee.....	145 50	
	Expenses of members of committee.....	73 70	
	Travel of self and messengers, 574 miles each.....	172 20	
F. H. Smith.....	Services as stenographer, May and June, 1866.....	.....	1,204 85
R. H. Sherman.....	Services as tally clerk, April 1 to June 30, 1866.....	.....	610 00
William K. Mebaffy.....	Services as reading clerk, April 1 to June 30, 1866.....	.....	90 00
		.....	90 00

William H. Smith	Services as messenger in House library, June, 1866.....	.....	75 00
Mrs. D. Mills	Witness before Committee on the Judiciary, 1 day	2 00	
	470 miles travel.....	47 00	
H. J. Raymond	Newspapers, 1st session 39th Congress.....	.....	49 00
N. Taylor	do.....	.....	50 00
D. Morris	do.....	.....	50 00
F. E. Woodbridge	do.....	.....	50 00
A. H. Laffin	do.....	.....	50 00
J. B. Grinnell	do.....	.....	50 00
B. G. Harris	do.....	.....	50 00
H. S. Bundy	do.....	.....	50 00
L. H. Rousseau	do.....	.....	50 00
J. W. Patterson	do.....	.....	50 00
J. B. Alley	do.....	.....	50 00
J. M. Ashley	do.....	.....	50 00
J. F. Benjamin	do.....	.....	50 00
J. R. Hubbell	do.....	.....	50 00
S. M. Cullum	do.....	.....	50 00
Chicago Republican Company	Daily Republican furnished to—.....	.....	
	Hon. Thaddeus Stevens, from December 8, 1865, to June 6, 1866.....	5 00	
	N. P. Banks, from December 26, 1865, to June 6, 1866.....	4 40	
C. E. P. Bailey	Services as page, June, 1866 .....	.....	9 40
G. L. Ordway	Services as page, June, 1866 .....	.....	60 00
F. A. Pike	Stationery, 1st session 39th Congress .....	.....	60 00
A. A. Barker	do.....	.....	72 61
T. N. Stillwell	do.....	.....	67 75
H. D. Washburn	do.....	.....	47 53
M. G. Copeland	9 Venetian window awnings .....	.....	42 09
William Averill	Temporary clerk, pay-roll for June, 1866 .....	.....	162 00
A. J. Larnier	do.....	150 00	
V. Pulizzi	do.....	150 00	
J. Holcomb	do.....	150 00	
E. Cowan	do.....	125 00	
W. W. Chase	do.....	125 00	
	do.....	100 00	
J. S. Read	Folder, pay-roll for June, 1866 .....	.....	800 00
Junius Simons	do.....	100 00	
Theo. Blague	do.....	100 00	
John Sterling	do.....	100 00	

A.—Detailed statement of disbursements, &c —Continued.

To whom paid.	For what object.	Amount.	Total.
J. T. Chauncey	Folder, pay-roll for June, 1866.....	\$100 00	
T. M. Killinger	do.....do.....	90 00	
W. G. Brower	do.....do.....	90 00	
J. M. Shomo.....	do.....do.....	90 00	
A. H. Walcott	do.....do.....	90 00	
John Dwyer.....	do.....do.....	90 00	
Philander Ward	do.....do.....	90 00	
Oliver Peabody.....	do.....do.....	90 00	
Briggs Thomas	do.....do.....	90 00	
De W. C. Lewis	do.....do.....	90 00	
Harrison Weaver	do.....do.....	90 00	
Ferdinand Irwin.....	do.....do.....	90 00	
Samuel Ten Eyck	do.....do.....	90 00	
E. P. Ferris	do.....do.....	90 00	
P. H. Griswold	do.....do.....	90 00	
E. W. Morse.....	do.....do.....	90 00	
E. Tuck.....	do.....do.....	90 00	
J. E. Hammond.....	do.....do.....	90 00	
D. A. Hull	do.....do.....	90 00	
J. W. Pope.....	do.....do.....	90 00	
H. W. McGeorge.....	do.....do.....	90 00	
J. L. McKie	do.....do.....	90 00	
B. D. Peck	do.....do.....	90 00	
J. W. Pettit	do.....do.....	90 00	
W. S. Young	do.....do.....	90 00	
H. W. Shipman.....	do.....do.....	90 00	
W. H. Boughter	do.....do.....	90 00	
W. R. Smith.....	do.....do.....	90 00	
William Davis	do.....do.....	90 00	
H. C. Sherrill.....	do.....do.....	90 00	
C. W. Linthurst	do.....do.....	90 00	
S. S. Strachan	do.....do.....	90 00	
William Cunningham	do.....do.....	90 00	
Benjamin Ross	do.....do.....	90 00	

H. Z. Knapp.....	do.....	90 00
G. F. Colby.....	do.....	90 00
Lawrence Bess.....	do.....	90 00
S. Malcomb.....	do.....	90 00
J. F. Sweetman.....	do.....	90 00
W. Stringer.....	do.....	90 00
W. Moran.....	do.....	90 00
Julius De Sauls.....	do.....	75 00
C. F. Rowe.....	do.....	75 00
M. Flaherty.....	do.....	75 00
C. D. Choate.....	do.....	60 00
P. B. Prince.....	do.....	60 00
S. Stelle.....	do.....	60 00
Hiram Baldwin.....	do.....	60 00
E. McConnell.....	do.....	60 00
T. Martin.....	do.....	54 00
Philip Nolan.....	do.....	54 00
R. Watkins.....	do.....	54 00
4,787 00		
C. Stebbins.....	Folder, pay-roll for June, 1866.....	100 00
A. J. Morey.....	do.....	100 00
S. G. Bugh.....	do.....	100 00
J. W. Nightingale.....	do.....	100 00
H. W. Morrison.....	do.....	100 00
H. M. Maguire.....	do.....	100 00
P. H. Reinhard.....	do.....	100 00
P. Stevens.....	do.....	90 00
William Dalton.....	do.....	90 00
880 00		
William Tabler.....	Folder, pay-roll for June, 1866.....	12 40
J. Wilkinson.....	do.....	3 70
O. Shomo.....	do.....	16 96
Charles Wincher.....	do.....	11 78
E. Peck.....	do.....	1 00
Albert Shaw.....	do.....	13 85
C. Sayer.....	do.....	3 00
C. E. Gilson.....	do.....	22 10
William Bradford.....	do.....	3 50
H. Whitefoot.....	do.....	14 10
Thomas Tippet.....	do.....	6 25
Francis Butterbaugh.....	do.....	3 00

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
Oscar Huguely.....	Folder, pay-roll for June, 1866	\$13 82	\$188 39
John Lambert.....	do.....do	15 53	
C. M. Young.....	do.....do	9 40	
S. C. Straley.....	do.....do	1 80	
John Dailey.....	do.....do	6 55	
William Langston.....	do.....do	10 20	
George Clift.....	do.....do	4 50	
John Harris.....	do.....do	9 55	
Nelson Carr.....	do.....do	5 40	
Jacob D. Forney.....	Engineer, pay-roll for June, 1866	125 00	725 00
James H. Knox.....	do.....do	100 00	
William B. Turner.....	do.....do	100 00	
H. S. Linker.....	do.....do	100 00	
J. H. Barker.....	do.....do	60 00	
C. P. Bundick.....	do.....do	60 00	
William Hutchinson.....	do.....do	60 00	
John H. Garges.....	do.....do	60 00	
S. A. Wilkinson.....	do.....do	60 00	
John T. Johnson.....	Laborer, pay-roll for June, 1866	54 00	
Lewis Saunders.....	do.....do	54 00	
Alfred Dade.....	do.....do	54 00	
T. King.....	do.....do	54 00	
Henry Hall.....	do.....do	54 00	
T. P. Bell.....	do.....do	54 00	
J. W. Lee.....	do.....do	54 00	
Lewis Cartwright.....	do.....do	54 00	
William A. Duckett.....	do.....do	54 00	
Alexander Bruce.....	do.....do	54 00	
John V. Johnson.....	do.....do	54 00	
William Twine.....	do.....do	54 00	
S. Bruce.....	do.....do	45 00	
Aaron Russell.....	do.....do	60 00	

Aquilla Hall	do	60 00	813 00
W. B. Atkinson	Page, pay-roll for June, 1866	60 00	
William Chapline	do	60 00	
Philip McDevitt	do	60 00	
J. R. Davis	do	60 00	
Joseph Dyas	do	60 00	
William Hill	do	60 00	
W. D. Lanston	do	60 00	
F. W. Larner	do	60 00	
Edward Merritt	do	60 00	
W. E. Newman	do	60 00	
S. H. Nealey	do	60 00	
G. H. Scidmore	do	60 00	
A. S. Pillsbury	do	60 00	
W. C. Raymond	do	60 00	
Theodore Slater	do	60 00	
Henry Stewart	do	60 00	
R. E. Stevens	do	60 00	
H. C. Wall	do	60 00	
C. H. Willard	do	60 00	
J. B. Moses	do	60 00	
C. G. Burlingame	Riding page, pay-roll for June, 1866	60 00	1,200 00
F. P. James	do	60 00	
A. T. Gardner	do	60 00	
William Dean	Temporary mail-boy, pay-roll for June, 1866	75 00	180 00
B. M. Van Kuren	do	75 00	
B. G. Wheeler	Furniture pay-roll for June, 1866	150 00	150 00
J. Reese	do	100 00	
Hiram Price	Stationery, 1st session 39th Congress		250 00
R. J. Stevens	Clerk to Committee on Appropriations, June, 1866		47 96
T. A. Beaton	Hauling 1,168 loads documents, June, 1866		180 00
J. B. Clark, jr	Hauling 150 loads documents, June, 1866		584 00
H. P. Brown	Clerk to Committee on War Debts, &c., from May 21 to July 15, 1866, at \$4 per day		75 00
William Conn	Services as folder in post office for May, 1866		224 00
William Conn	Services as folder in post office for June, 1866		100 00
Mrs. Stillman Moores	52 buckets of paste for folding-room, June, 1866		100 00
			78 00

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
E. Z. Steever.....	New set of washers for cocks.....	\$2 50	
	4 pounds putty.....	50	
	2 plumbers and assistants, 3 days.....	36 00	
	1 2-light pendant.....	6 00	
	Hooks.....	25 00	
	2 gas-fitters and assistants, 1 day.....	12 00	
	2 plumbers, 1 day.....	10 00	
	2 plumbers and assistants, 1 day.....	12 00	
	2 plumbers and assistants, 1 day.....	12 00	
	6 pounds solder.....	3 60	
	New washers and 3 new brass couplings.....	3 50	
	2 plumbers and assistants, 1 day.....	12 00	
	1 large size marble washbasin.....	5 50	
	Plaster of Paris and putty, 2 washers.....	75	
	1 new brass coupling.....	1 50	
	6 pounds solder.....	3 60	
	2 plumbers, 2 days.....	20 00	
			\$141 70
T. A. Beaton.....	Use of 4 horses and carryalls for carrying mails, June, 1866.....	300 00	
Kitty Bruce.....	Washing 211½ dozen towels, at 50 cents per dozen.....	105 87	
Mrs. J. D. Ward.....	Services as watcher, June, 1866.....	90 00	
C. Lloyd.....	Freight charges on flag.....	50	
	Express on package for Committee on the Militia.....	1 65	
	Express on desk.....	2 65	
	Express on desk.....	4 55	
	Telegram to Mr. Orne.....	50	
	Telegram to Mr. Allen.....	60	
	Freight on desk.....	1 90	
	Express on bundle of binding.....	95	
	Freight on paper.....	6 90	
	Drayage on chairs.....	4 00	
	Drayage on paper.....	1 50	
	Telegram for Committee on Foreign Affairs.....	1 00	
			26 70

G. F. Hyde.....	Freight on 81 bundles paper.....	1 13	18 01
	Cartage.....	88	
	Freight on 92 bundles paper.....	2 00	
	Cartage.....	14 00	
H. Conter.....	Witness before Committee on Agriculture, 6 days.....	12 00	
	2 miles' travel.....	20	
W. J. Murtagh & Co.....	Advertising proposals for fuel.....	.....	12 20
William Twine.....	Washing 14½ dozen towels, June, 1866.....	.....	12 00
J. B. Davidson.....	Freight on 50 bundles paper.....	90	7 12
	Cartage.....	5 00	
G. F. Hyde.....	Wharfage on 47 bundles of paper.....	80	5 90
	Cartage.....	5 00	
W. H. Harrover.....	Fender for lantern.....	.....	5 80
A. A. Rice.....	Stationery, 1st session 39th Congress.....	.....	1 00
Oakes Ames.....	do.....do.....	.....	72 31
John B. Alley.....	do.....do.....	.....	70 54
J. H. Rice.....	do.....do.....	.....	69 39
J. H. Ketchum.....	do.....do.....	.....	59 67
A. Cobb.....	do.....do.....	.....	57 54
P. Baxter.....	do.....do.....	.....	57 09
J. Baker.....	do.....do.....	.....	57 02
U. Mercur.....	do.....do.....	.....	56 43
J. W. Patterson.....	do.....do.....	.....	53 71
J. C. Mitchell & Co.....	6 dozen quarts Pacific writing fluid.....	.....	53 42
R. B. Hays.....	Stationery, 1st session 39th Congress.....	.....	48 00
D. R. Ashley.....	do.....do.....	.....	46 81
G. S. Orth.....	do.....do.....	.....	36 43
J. C. McGuire & Co.....	1 counting-room desk.....	.....	24 34
L. D. La Rue.....	Folder in post office, from May 1 to June 30, 1866.....	.....	49 00
L. C. White.....	Folder in post office, from June 15 to 30, 1866.....	.....	112 50
C. E. Gilson.....	Services folding speeches, July, 1866.....	.....	37 50
J. Bulb.....	Witness before Committee on Banking and Currency, 3 days.....	6 00	27 49
	48 miles travel.....	4 80	
H. L. Chubbuck.....	Witness before Committee on Agriculture, 7 days.....	14 00	10 80
	4 miles' travel.....	40	
			14 40

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
William Hemsted.....	Witness before Committee to investigate assault on Mr. Painter, 1 day.....	.....	\$2 00
L. Jones.....	Witness before Committee to investigate assault on Mr. L. H. Rousseau, 1 day.....	.....	2 00
E. R. V. Wright.....	Newspapers, 1st session 39th Congress.....	.....	50 00
T. E. Noel.....	do.....	.....	50 00
F. & J. Rives.....	Reporting debates and printing same in Globe, from June 1 to 30, 1866, 402 $\frac{1}{2}$ $\frac{3}{8}$ columns, at \$7 50.....	.....	3,120 70
George V. Lawrence.....	Stationery, 1st session 39th Congress.....	.....	15 70
C. A. Dana.....	Witness before Committee on Provost Marshal General's Office, 12 days.....	\$24 00	
	1,684 miles' travel.....	168 40	
George Shanklin.....	Newspapers, 1st session 39th Congress.....	.....	192 40
S. Sinclair.....	Daily Tribune to—	.....	50 00
	Hon. S. Colfax, from December 1, 1865, to July 20, 1866.....	6 28	
	S. McKee, from December 7, 1865, to July 20, 1866.....	6 12	
	S. Shellabarger, from December 7, 1865, to July 20, 1866.....	6 12	
	T. Stevens, from December 7, 1865, to July 20, 1866.....	6 12	
	G. W. Julian, from December 7, 1865, to July 20, 1866.....	6 12	
	U. Mercur, from December 9, 1865, to July 20, 1866.....	6 05	
	Clerk's office, from December 11, 1865, to July 20, 1866.....	6 04	
	W. B. Allison, from December 11, 1865, to July 20, 1866.....	6 04	
	B. C. Cook, from December 15, 1865, to July 20, 1866.....	5 91	
	William Higby, from December 20, 1865, to July 20, 1866.....	5 78	
	U. P. Banks, from December 25, 1865, to July 20, 1866.....	5 61	
	S. W. Moulton, from January 11, 1866, to July 20, 1866.....	5 23	
	W. D. Kelley, from January 15, 1866, to July 20, 1866.....	5 10	
	T. Williams, from January 19, 1866, to July 20, 1866.....	5 00	
	J. A. Garfield, from March 3, 1866, to July 20, 1866.....	3 82	
	R. Hart, from March 16, 1866, to July 20, 1866.....	3 46	
	Semi-weekly Tribune to W. E. Niblack, from December 8, 1865, to July 20, 1866.....	2 50	
			91 30
H. J. Raymond.....	Daily Times to—	.....	
	Hon. S. Colfax, from December 1, 1865, to July 20, 1866.....	6 45	
	J. S. Morrill, from December 2, 1865, to July 20, 1866.....	6 40	
	H. L. Dawes, from December 6, 1865, to July 20, 1866.....	6 30	

J. F. Farnsworth.....	Newspapers, 1st session 39th Congress.....		6 25	79 20
William D. Kelley.....	do do do.....		6 25	46 90
T. T. Davis.....	do do do.....		6 25	44 90
O. Ames.....	do do do.....		6 20	44 15
M. Welker.....	do do do.....		6 15	43 84
A. Thornton.....	do do do.....		6 05	42 94
J. M. Humphrey.....	do do do.....		5 85	40 95
T. Williams.....	do do do.....		5 65	39 00
P. Baxter.....	do do do.....		5 25	37 58
B. C. Cook.....	do do do.....			36 31
H. L. Dawes.....	do do do.....			35 00
J. A. Garfield.....	do do do.....			33 39
U. Mercur.....	do do do.....			32 84
A. H. Rice.....	do do do.....			30 50
M. Halstead & Co.....	Cincinnati Daily Commercial to— Hon. C. Delano..... William Lawrence..... S. Colfax..... M. C. Kerr.....	7 33½ 7 33½ 6 33½ 6 00		28 15
J. A. Nicholson.....	Newspapers, 1st session 39th Congress.....			27 00
W. E. Niblack.....	do do do.....			25 50
Samuel McKee.....	do do do.....			24 40
C. Delano.....	Newspapers, 1st session 39th Congress Springfield Republican to— H. L. Dawes..... W. B. Washburn..... N. P. Banks.....	5 60 5 65 5 15		24 00 22 00
S. Bowles & Co.....				
R. Hart.....	Newspapers, 1st session 39th Congress.....			16 40 14 31

A.—Detailed statement of disbursements, &c.—Continued.

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
C. Lasalle	Courier des Etats-Unis to N. P. Banks .....	.....	\$12 00
C. Wilson & Co	Evening Journal (tri-weekly) to S. Colfax	\$3 75	
	Evening Journal (daily) to B. C. Cook	6 75	
Douglas & Conner	Indianapolis Journal to S. Colfax .....	.....	10 50
Rochester Evening Express	1 copy to Roswell Hart .....	.....	8 15
Dunbar, Waters & Co	Boston Daily Advertiser to A. H. Rice .....	.....	6 65
William Bross	Chicago Tribune to S. S. Marshal .....	.....	6 00
Curtis, Morey & Co	Union and Advertiser to R. Hart .....	.....	6 00
D. D. Brown	Rochester Daily Democrat to R. Hart .....	.....	6 00
Worthington, Flanders & Co	Daily Traveller, Boston, to N. P. Banks .....	.....	5 85
Wm. B. Dana & Co	Commercial and Financial Chronicle to T. M. Pomeroy .....	.....	5 83
Cowley, Roby & Smith	Daily Morning Journal to J. A. Bingham .....	.....	5 00
Welch & Robb	The Age to J. A. Nicholson .....	.....	4 50
H. W. Dutton & Son	Boston Daily Evening Transcript to Wm. Higby .....	.....	4 50
P. Allen & Son	Pittsfield Sun to H. L. Dawes .....	.....	4 09
J. L. Robinson & Co	Adams Transcript to H. L. Dawes .....	.....	1 54
A. Herrick & Sons	New York Atlas to A. J. Glossbrenner .....	.....	1 65
A. G. Belles	Border Times to R. T. Van Horn .....	.....	1 50
S. W. Moulton	Newspapers, 1st session 39th Congress .....	.....	1 00
H. L. Dawes	Stationery, 1st session 39th Congress .....	.....	39 47
G. W. Scofield	do .....	.....	74 52
C. Sitgreaves	do .....	.....	72 16
H. Van Aernam	do .....	.....	66 30
J. W. Longyear	do .....	.....	62 10
A. H. Laffin	do .....	.....	61 59
A. Thornton	do .....	.....	60 52
R. P. Buckland	do .....	.....	56 98
F. E. Woodbridge	do .....	.....	56 61
H. Grider	do .....	.....	52 75
Wm. Lawrence	do .....	.....	51 99
S. W. Moulton	do .....	.....	49 83
J. H. D. Henderson	do .....	.....	49 29
A. C. Harding	do .....	.....	41 73
J. A. Garfield	do .....	.....	34 96
	do .....	.....	23 76

B. C. Cook	do	do	19 87
H. E. Paine	do	do	6 44
Daus, Earle & Co	Missouri Valley Register to R. T. Van Horn		1 00
Jos. H. Richards	For Nation to—		
	Wm. B. Allison	3 40	
	Geo. W. Julian	3 40	
J. Gibson	Witness before Committee on Agriculture, 2 days	4 00	6 80
	6 miles' travel	60	
J. C. Williams	Witness before Committee on Agriculture, 4 days		4 60
H. H. Elter	Witness before Committee on Agriculture, 18 days	36 00	8 00
	2 miles' travel	20	
G. W. Reardon	Witness before Committee on Agriculture, 1 day	2 00	36 20
	2 miles' travel	20	
M. Reardon	Witness before Committee on Agriculture, 12 days	24 00	2 20
	2 miles' travel	20	
S. S. Marshall	Stationery, 1st session 39th Congress		24 20
J. W. Forney	Daily Press to C. Lloyd, chief clerk House of Representatives		33 55
G. Knapp & Co	Daily Missouri Republican to R. T. Van Horn		4 67
J. H. Farquhar	Stationery, 1st session 39th Congress		7 00
J. F. Farnsworth	do		65 50
J. M. Humphrey	do		57 10
P. Sawyer	do		55 85
F. & J. Rives	do		47 76
E. Z. Steever	22 sets, 68 volumes each, Congressional Globe and Appendix, from 23d to 38th Congress, inclusive, 496 volumes, at \$5		7,480 00
	1 large size marble wash-basin	5 50	
	1 new coupling and set of washers, plaster of Paris, and putty	2 50	
	6 pounds solder	3 60	
	2 plumbers, 2 days	20 00	
	8 pounds solder	4 80	
	2 plumbers, 2 days	20 00	
	5 pounds solder	3 00	
	2 plumbers and assistants, 2 days	24 00	
	200 feet 2½-inch 4-ply engine rubber hose	420 00	
	150 feet 1-inch 3-ply hydrant rubber hose	112 50	
	1½ dozen 1-inch couplings, with washers	22 50	
	1½ dozen large brass clamps for 2½-inch couplings	40 00	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
E. Z. Steever, Continued	4 large 2½-inch brass couplings, with washers.....	\$24 00	
	104 feet copper wire for hose	7 28	
	1 1-inch brass pipe, with screw tip and cock.....	6 00	
	Repairing and altering threads in 2½-inch branch pipe.....	3 00	
	Express and portage.....	6 00	
	2 plumbers, 2 days.....	20 00	
			\$744 68
Wm. P. Copeland	20 per cent. additional on salary from June 1, 1864, to January 15, 1866 .....	.....	207 49
Wm. F. Corbett.....	20 per cent. additional on salary from June 1, 1864, to January 1, 1866.....	.....	203 33
Wm. Judge	20 per cent. additional on salary from June 1, 1864, to February 28, 1866 .....	.....	166 66
J. A. Renshaw	20 per cent. additional on salary from June 1, 1864, to December 31, 1865 .....	.....	150 00
N. G. Ordway	Serving subpoenas and miles travelled to summon the following witnesses before the Committee on the Judiciary:		
	Joseph Holt, 1 day, \$2; 2 miles' travel, 20 cents.....	2 20	
	E. M. Stanton, 1 day, \$2; 2 miles' travel, 20 cents.....	2 20	
	T. T. Eckert, 1 day, \$2; 2 miles' travel, 20 cents	2 20	
	J. B. Merritt, 1 day, \$2; 2 miles' travel, 20 cents	2 20	
	J. B. Merritt, 1 day, \$2; 2 miles' travel, 20 cents	2 20	
	F. Leiber, 1 day, \$2; 2 miles' travel, 20 cents	2 20	
	James Speed, 1 day, \$2; 2 miles' travel, 20 cents	2 20	
	Wm. Campbell, 1 day, \$2; 470 miles' travel, \$47	49 00	
	S. Conover, 1 day, \$2; 470 miles' travel, \$47	49 00	
	S. Conover, 1 day, \$2; 470 miles' travel, \$47	49 00	
	F. B. Wright, 1 day, \$2; 570 miles' travel, \$57	59 00	
	Mr. Patten, 1 day, \$2; 550 miles' travel, \$55	57 00	
	J. McGill, 1 day, \$2; 470 miles' travel, \$47	49 00	
	Jos. Hoar, 1 day, \$2; 470 miles' travel, \$47	49 00	
	Mrs. Dunham, 1 day, \$2; 470 miles' travel, \$47	49 00	
	Charles Dunham, 1 day, \$2; 470 miles' travel, \$47	49 00	
	P. Sevens, 1 day, \$2; 560 miles' travel, \$56	58 00	
	William H. Roberts, 1 day, \$2; 470 miles' travel, \$47	49 00	
	Miss Knapp, 1 day, \$2; 494 miles' travel, \$49 40	51 40	
	John Waters, 1 day, \$2; 570 miles' travel, \$57	59 00	
	— Neally, 1 day, \$2; 470 miles' travel, \$47	49 00	
	James Finley, 1 day, \$2; 80 miles' travel, \$8	2 80	

N. G. Ordway.....	L. J. Weichman, 1 day, \$2; 280 miles' travel, \$28.....	30 00	943 00
	James Speed, 1 day, \$2; 2 miles' travel, 20 cents.....	2 20	
	Mrs. Drake Mills, 1 day, \$2; 490 miles' travel, \$49.....	51 00	
	Travel and expenses to ascertain correctness of testimony of Wm. H. Roberts.....	54 00	
	do.....do.....J. A. Hoar.....	55 00	
	Expenses incurred in investigating Memphis riots:		
	Fare, hotel bills, &c., to Memphis and return.....	281 00	
	Board for messenger and reporter, rooms for Committee.....	249 00	
	Printing blanks.....	4 00	
	Paid detectives.....	50 00	
	Paid colored men for obtaining information.....	10 00	
	Paid for hack hire, securing witnesses, &c.....	63 00	
	Paid for papers, stationery, telegrams, &c.....	75 00	
	Paid for S. A. Andrews's bill.....	64 00	
	Paid for stationery.....	26 25	
	Paid for hotel bill at St. Louis.....	12 50	
	Incidental expenses of Mr. Smith.....	50 00	
N. G. Ordway.....	Expenses at funeral of James Humphrey, fare and sleeping berths to New York and return.....	159 60	884 75
	Hacks, &c., at funeral.....	57 00	
	Spotts & Hawks' bill (St. Nicholas).....	79 00	
	Gloves and crape for Committee, and crape for members.....	445 00	
	2 travels to New York, 940 miles.....	94 00	
N. G. Ordway.....	Subpœnas and travel to summon 173 witnesses on account of Memphis riots, &c.....	834 60	
N. G. Ordway.....	Subpœnas and travel to summon 26 witnesses for Committee on Banking and Currency.....	707 60	
N. G. Ordway.....	Subpœnas and travel to summon 27 witnesses for Committee on Military Affairs.....	355 80	
N. G. Ordway.....	Subpœnas and travel to summon 25 witnesses before Committee on Agriculture.....	285 58	
N. G. Ordway.....	Subpœnas and travel to summon 16 witnesses on account of "breach of privilege".....	145 20	
N. G. Ordway.....	Services as reporter employed by the Select Committee appointed to investigate the Memphis riots, 12 days, at \$10.....	36 40	
B. Pittman.....	934 folios of 100 words written out, at 25 cents.....	120 00	
	Expenses of trip from Cincinnati to Memphis, and return via St. Louis.....	233 50	
		94 50	
J. M. Broomall.....	Expenses as a member of Committee to investigate Memphis Riots; hotel bills 19 days, at \$5.....	95 00	448 00
	Travelling expenses, 2,926 miles.....	292 60	
E. B. Washburne.....	Expenses as a member of Committee to investigate Memphis Riots; hotel bills 19 days, at \$5.....	95 00	387 60
	2,926 miles' travel.....	292 60	
			387 60

A.—Detailed statement of disbursements, &c.—Continued.

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
G. S. Shanklin.....	Expenses as member of Committee to investigate Memphis Riots; hotel bills, &c., 19 days, at \$5 2,926 miles' travel.....	\$95 00 292 60	\$387 60
William Campbell	Witness before Committee on the Judiciary, 23 days..... 470 miles' travel.....	46 00 47 00	
J. F. Wilson	Expenses telegraphing on business of Committee on Judiciary.....	.....	97 00
J. Walter.....	Witness before Committee on Memphis Riots, 1 day.....	.....	2 07
A. Hays.....	do.....do.....	.....	2 00
A. Loch.....	do.....do.....	.....	2 00
J. Snead.....	do.....do.....	.....	2 00
Lucy Tibbs.....	do.....do.....	.....	2 00
P. Lane	do.....do.....	.....	2 00
J. Maynard	do.....do.....	.....	2 00
Harriet Anner.....	do.....do.....	.....	2 00
G. Thomas.....	do.....do.....	.....	2 00
S. E. Delts.....	do.....do.....	.....	2 00
Margaret Gardner.....	do.....do.....	.....	2 00
Rachel Delts.....	do.....do.....	.....	2 00
Mollie Haynes	do.....do.....	.....	2 00
S. A. Andrews.....	do.....do.....	.....	2 00
Lavenia Goodell.....	do.....do.....	.....	2 00
Rhoda Simmons.....	do.....do.....	.....	2 00
A. Winter.....	do.....do.....	.....	2 00
Mary Jordan.....	do.....do.....	.....	2 00
D. C. Forney.....	Chronicle to—.....	.....	
	William B. Allison.....	7 66	
	R. P. Spalding.....	7 81	
	P. Baxter.....	7 54	
	G. F. Miller.....	7 54	
	T. Stevens.....	9 10	
	S. McKee.....	9 10	
	William E. Niblack.....	9 10	
	William E. Finck.....	9 10	

Cincinnati Gazette Co.....	G. W. Julian.....	9 10	238 00
	A. A. Bradford.....	7 50	
	L. W. Ross.....	7 34	
	A. A. Denny.....	7 34	
	R. Hart.....	7 23	
	R. T. Van Horn.....	7 23	
	William Higby.....	7 17	
	M. Welker.....	7 08	
	Committee of Ways and Means.....	7 00	
	N. P. Banks.....	7 00	
	Clerk's office, room 58.....	12 00	
	Chief clerk's office, room 57, 3 copies.....	36 00	
	C. Delano.....	14 50	
	A. H. Rice.....	6 40	
	H. P. H. Bromwell.....	6 40	
	J. A. Garfield.....	6 34	
	T. Williams.....	7 42	
	O. Ames.....	6 16	
	J. F. Farnsworth.....	1 84	
Cincinnati Gazette Co.....	Cincinnati Gazette to—		
	B. Eggleston.....	6 50	
	G. W. Julian.....	7 50	
	Samuel Shellabarger.....	7 50	
	Samuel McKee.....	7 50	
	J. A. Garfield.....	6 20	
	M. Welker.....	7 15	
	S. Colfax.....	1 50	
W. J. Murtagh & Co.....	National Republican to—		43 85
	T. Stevens.....	4 80	
	S. McKee.....	2 30	
	G. S. Boutwell.....	4 80	
	L. W. Ross.....	4 50	
	J. F. Farnsworth.....	3 10	
	N. P. Banks.....	4 40	
	A. H. Rice.....	4 20	
	Clerk's office.....	2 90	
A. A. Bradford.....	Newspapers, 1st session 39th Congress.....		31 00
William Higby.....	do.....		29 00
	do.....		25 46

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
J. S. Morrill.....	Newspapers, 1st session 39th Congress.....	.....	\$14 60
G. W. Julian.....	do.....do.....	.....	12 88
Chicago Republican Co.....	Chicago Republican, furnished to N. P. Banks, T. Stevens.....	.....	9 40
B. Wood.....	New York Daily News to J. A. Nicholson.....	.....	6 50
G. Bergner.....	Daily Telegraph to G. F. Miller.....	.....	4 00
Philp & Solomons.....	12 memorandums.....	\$2 64	
	Do.....	3 36	
	Do.....	3 72	
	12,000 white envelopes.....	104 50	
	10 reams letter printed pamphlet, ruled.....	97 50	
	24,000 speech envelopes.....	87 12	
	10 reams note printed pamphlet, ruled.....	79 50	
	2 dozen spools, 19 tape.....	36 00	
	6 long cap day-books.....	9 60	
	1 Colton's Atlas.....	20 00	
E. H. Rollins.....	Stationery, 1st session 39th Congress.....	.....	441 94
H. P. H. Bromwell.....	do.....do.....	.....	73 85
R. Conkling.....	do.....do.....	.....	60 65
S. Shellabarger.....	do.....do.....	.....	60 17
L. W. Ross.....	do.....do.....	.....	52 72
Thomas E. Noell.....	do.....do.....	.....	50 93
G. R. Latham.....	do.....do.....	.....	48 04
A. A. Bradford.....	do.....do.....	.....	38 94
J. Snevel.....	do.....do.....	.....	31 04
	Witness before Committee on the Judiciary, 9 days.....	18 00	
	470 miles' travel.....	47 00	
R. J. Stevens.....	Services as Clerk to Committee on Appropriations, July, 1866.....	.....	65 00
F. H. Smith.....	Services as stenographer, July, 1866.....	.....	180 00
Mrs. J. D. Ward.....	Services as watcher, &c., July, 1866.....	.....	310 00
Snow, Coyle & Co.....	Publishing in National Intelligencer proposals for fuel.....	.....	93 00
I. Goodnow.....	Use of horse and wagon, July, 1866.....	77 50	
	Use of saddle-horse, July, 1866.....	62 00	
			139 50

R. E. Trowbridge.....	Horses and carriages for Committee on Enrolled Bills, 1st session 39th Congress.....	75 00
A. Ritter.....	Witness before Committee on Agriculture, 6 days.....	12 00
	2 miles' travel.....	20
H. G. Hayes.....	Salary as assistant reporter to Committee under resolution of July 25, 1866, for June and July, 1866.....	12 20
Ira Goodnow.....	Car tickets for June and July.....	610 00
J. W. Leftwich.....	Newspapers, 1st session 39th Congress.....	35 00
William B. Stokes.....	do.....	50 00
E. Cooper.....	do.....	50 00
N. G. Taylor.....	do.....	50 00
H. Maynard.....	do.....	50 00
William H. Koontz.....	do.....	50 00
William C. Bryant & Co.....	Evening Post to—	50 00
	N. P. Banks.....	7 50
	William Higby.....	7 50
	A. A. Bradford.....	7 50
	R. S. Hale.....	7 50
	J. S. Morrill.....	19 00
Daily World Co.....	Daily World to—	49 00
	William E. Finck.....	6 28
	C. Sitgreaves.....	6 28
	J. M. Humphrey.....	3 34
	B. M. Boyer.....	5 49
	A. Thornton.....	3 31
	M. C. Kerr.....	10 00
	Clerk's office.....	6 28
B. M. Boyer.....	Newspapers, 1st session 39th Congress.....	40 98
S. S. Marshall.....	do.....	39 21
L. W. Ross.....	do.....	24 97
J. L. Demorest.....	do.....	24 41
Chickering & Axtell.....	1 copy of Chronicle delivered daily to Committee on Appropriations.....	6 96
N. G. Taylor.....	Berkshire County Eagle, to Henry L. Dawes.....	1 50
William H. Koontz.....	Stationery, 1st session 39th Congress.....	70 16
J. W. Leftwich.....	do.....	66 44
E. Cooper.....	do.....	60 70
C. D. Hubbard.....	do.....	57 52
J. H. Defrees.....	do.....	57 48
Burt. Van Horn.....	do.....	56 40
	do.....	56 82

A.—Detailed statement of disbursements, &c—Continued.

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
G. W. Julian	Stationery, 1st session 39th Congress	.....	\$52 98
William Windom	do.....do	.....	52 33
H. Maynard	do.....do	.....	50 09
William B. Stokes	do.....do	.....	50 06
R. C. Schenck	do.....do	.....	47 09
R. P. Spalding	do.....do	.....	46 42
N. P. Banks	do.....do	.....	46 31
J. M. Broomall	do.....do	.....	45 50
S. F. Wilson	do.....do	.....	33 28
R. T. Van Horn	do.....do	.....	36 75
J. W. McClurg	do.....do	.....	35 86
B. F. Loan	do.....do	.....	30 96
J. Bidwell	do.....do	.....	20 83
M. Welker	do.....do	.....	18 10
G. F. Miller	do.....do	.....	14 84
S. H. Boyd	Time, expenses, &c., contesting seat of J. R. Kelso, per House resolution, June 28, 1866.	.....	2,500 00
N. G. Ordway	Subpoenas and travel to summon 30 witnesses before Committee on Provost Marshal General's Office.	.....	1,914 40
A. Cobb	Carriage hire while serving on Committee on Enrolled Bills, 1st session 39th Congress	.....	45 00
H. P. H. Bromwell	Newspapers, 1st session 39th Congress	.....	35 85
G. S. Boutwell	do.....do	.....	27 20
William B. Allison	do.....do	.....	11 00
T. B. Florence	Daily Constitutional Union, to William E. Finck	.....	4 00
C. O'Neill	Stationery, 1st session 39th Congress	.....	65 82
E. R. Eckley	do.....do	.....	59 93
T. Williams	do.....do	.....	58 18
J. S. Morrill	do.....do	.....	54 11
C. A. Eldridge	do.....do	.....	52 37
J. F. Wilson	do.....do	.....	51 33
William Higby	do.....do	.....	51 20
G. W. Anderson	do.....do	.....	48 93
S. McLean	do.....do	.....	36 27
H. Ward	do.....do	.....	33 82
L. Myers	do.....do	.....	33 61
J. Lynch	do.....do	.....	28 76

T. A. Jenckes.....	do.....	27 29
J. F. Chaves.....	do.....	20 77
B. Eggleston.....	do.....	19 47
H. J. Raymond.....	do.....	11 85
T. A. Beaton.....	Cartage of 1,535 loads of documents, July, 1866.....	667 50
U. H. Painter.....	Services as clerk to Committee on the Post Office and Post Roads, from July 1 to 28, 1866.....	112 00
A. S. Perham.....	Clerk to Committee on Invalid Pensions, from July 1 to 28, 1866.....	112 00
S. D. Lord.....	Clerk to Committee on Accounts, from July 1 to 28, 1866.....	112 00
W. S. Young.....	Services in folding-room, April and May, 1865.....	152 20
William Coun.....	Services as folder in post office, July, 1866.....	100 00
E. Giddings.....	Services in folding-room for March, 1866.....	93 00
J. B. Stott.....	Services in folding-room for July, 1866.....	93 00
J. Q. A. Yonkey.....	Services in folding-room for January, 1866.....	93 00
N. G. Ordway.....	Horse and carriage, from May 31 to August 1, 1866.....	152 50
Harriet P. Phisk.....	Services in ladies' retiring room, from July 1 to 28, 1866.....	42 00
S. Fuller.....	Time and expenses contesting seat of J. L. Dawson, per House resolution, July 13, 1866.....	2,500 00
C. B. Boynton.....	Services as chaplain of the House of Representatives, 1st session 39th Congress.....	750 00
E. McPherson.....	Certifying extracts of the journal of the House of Representatives, 1st session 39th Congress, 1,288 certificates, at 25 cents.....	322 00
J. T. Johnson.....	To reimburse for hire of Charles Wyre, 8 months, at \$15.....	\$120 00
	Caleb Turner, 8 months, at \$15.....	120 00
	J. Alonzo, 8 months, at \$15.....	120 00
S. J. Bowen.....	Excess postage on letters, &c., to members, from April 1 to June 30, 1866.....	360 00
N. G. Ordway.....	Travel from Warren, N. H., to Washington and return, 1st session 39th Congress, 1,146 miles.....	202 00
	Horse car tickets, from December 5, 1865, to August 1, 1866.....	114 00
		43 20
D. S. Bean.....	Services as temporary clerk in office of Sergeant-at-arms, July, 1866.....	157 20
William H. Smith.....	Services as messenger in House library, July, 1866.....	125 00
W. R. Elwell.....	Witness before Committee on Agriculture, 2 days.....	77 50
	272 miles' travel.....	4 00
Snow, Coyle & Co.....	National Intelligencer to—.....	27 20
	L. W. Ross.....	6 00
	A. A. Bradford.....	6 00
	J. A. Griswold.....	3 00
	J. A. Nicholson.....	6 00
	J. M. Humphrey.....	6 00
	S. W. Moulton.....	5 30
	B. M. Boyer.....	5 30
	4 copies from January 1, 1866, to January 1, 1867.....	40 00

87 50

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
T. Stevens	Newspapers, 1st session 39th Congress.....	.....	\$12 08
S. Perham	Stationery, 1st session 39th Congress.....	.....	64 50
S. Colfax	do.....do.....	.....	56 87
E. Dumont.....	do.....do.....	.....	52 30
William B. Allison	do.....do.....	.....	22 63
G. Marston.....	do.....do.....	.....	18 59
T. Stevens.....	do.....do.....	.....	10 33
G. L. Ordway	Services as page to Sergeant-at-arms, June, 1866 .....	.....	60 00
C. E. T. Bailey	Services as page to Sergeant-at-arms, July, 1866 .....	.....	62 00
J. B. Hunt	Services as page, from July 1 to 28, 1866 .....	.....	56 00
	Boards in ice box.....	\$0 75	
	Repairing case	1 50	
	Locks and hinges on 2 boxes	1 50	
	1 foot stool.....	7 75	
	1 towel box for bath-room	7 50	
	1 extra box	5 00	
	1 extra box	5 00	
	1 extra box	2 50	
	100 boxes, at \$3 50.....	350 00	
	3 extra boxes.....	15 00	
	1 pen-stand.....	50	
	1 extra box.....	6 00	
	1 extra box.....	5 00	
	1 extra box.....	3 00	
	Lock on box.....	50	
	1 dozen file sticks.....	60	
	10 Congressional Globe boxes, at \$3 50.....	35 00	
	3 extra boxes.....	15 00	
	1 extra box	4 00	
	Do.....	6 00	
	Do.....	2 00	
	1 walnut chest.....	16 00	
	1 bookcase	17 50	
	1 extra box.....	8 50	
	Casing sink.....	3 50	

	Repairing 2 chairs.....	1 25		650 25
	Removing sash.....	4 00		100 00
	2 locks on desks.....	1 00		
	Divisions in desk.....	1 75		
	1 chest for cotton waste.....	19 00		
	9 bulkheads and 2 coal chutes.....	63 40		
	Repairs in room of Military Committee.....	1 00		
	Repairing screen for folding-room.....	50		
	1 case of 42 pigeon holes.....	22 00		
	1 case of 33 pigeon holes.....	16 50		
	1 box.....	5 00		
	Bar and fastenings for document room.....	1 50		
Joseph Reese.....	Services as upholsterer, July, 1866.....			
G. M. Wight.....	1 walnut office table.....	28 00		
	1 walnut revolving chair.....	15 00		
	Covering lounge.....	3 50		
	4½ yards ap. reps.....	15 37		
	28 spiral springs.....	2 16		
	Repairing 6 office chairs.....	2 50		
	Repairing 1 sofa.....	1 50		
	4 sets brass-wheel casters.....	2 00		
L. Rollman.....	Clerk to Committee on Agriculture, from May 17 to July 28, 1866.....		70 03	
V. E. Smalley.....	Clerk to Committee on Military Affairs, from July 1 to 28, 1866.....		292 00	
J. L. Swift.....	Clerk to Committee on Foreign Affairs, July, 1866.....		168 00	
E. G. Bowdoin.....	Clerk to Committee on the Judiciary, July, 1866.....		124 00	
J. H. Riley.....	Clerk to Committee on Mines and Mining, July, 1866.....		124 00	
D. W. Bartlett.....	Clerk to Committee of Elections, from July 1 to 28, 1866.....		112 00	
J. L. Crounse.....	Clerk to Committee on Banking and Currency, from July 1 to 28, 1866.....		112 00	
J. Masty.....	Clerk to Committee on Indian Affairs, from July 1 to 28, 1866.....		112 00	
Sargent Stelle.....	Folder, pay-roll for March, 1866.....	62 00		
J. B. Moses.....	do.....do.....	62 00		
G. H. Scidmore.....	do.....do.....	62 00		
Ed. McConnell.....	do.....do.....	62 00		
H. Baldwin.....	do.....do.....	62 00		
J. H. Garges.....	Hauling ashes, &c., from vaults, from April 9 to June 30, 1866, 96 loads, at 25 cents.....		310 00	
J. B. Clarke, jr.....	Cartage of 155 loads of documents, July, 1866, at 50 cents.....		24 00	
Hudson Taylor.....	98,000 speech envelopes.....	353 78		
	39,000 speech envelopes.....	140 79		
				77 50

A.—Detailed statement of disbursements, &c.—Continued.

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
Hudson Taylor—Continued...	51,000 speech envelopes	\$184 11	
	146,000 speech envelopes	527 06	
	141,000 speech envelopes	509 61	\$1,715 35
Hudson Taylor.....	72,000 speech envelopes .....	.....	259 92
S. Moores.....	41 buckets paste furnished the folding-room in July, 1866.....	.....	61 50
J. B. Warder & Co.....	100 cords pine wood, at \$5 92.....	592 00	
	50 cords oak wood, at \$7 27	363 50	
T. A. Beaton.....	4 horses and carryalls for carrying mails in July, 1866.....	.....	955 50
Clinton Lloyd.....	3 horses and carriages in July, 1866.....	.....	310 00
Ira Goodnow.....	1 horse and carriage in July, 1866	77 50	232 50
	1 saddle-horse in July, 1866.....	62 00	
T. T. Fowler & Co.....	50,956 pounds of ice, delivered in July, 1866, at 75 cents.....	.....	139 50
T. T. Fowler & Co.....	34,547 pounds of ice, delivered in June, 1866, at 75 cents .....	.....	382 17
Kitty Bruce.....	Washing 262½ dozen towels in July, at 50 cents.....	.....	259 10
Boteler & Brother	1 water-cooler	8 00	131 25
	1 dozen shoe brushes and 1 dozen cork-screws	18 50	
	1 sprinkler	3 00	
	12 gross parlor matches	60 00	
	1 tack hammer	50	
T. Cooper.....	Witness before Committee on Agriculture, 22 days.....	44 00	90 00
	22 miles' travel	2 20	
Mrs. M. V. Throop	Printing 60 sheets parchment .....	.....	46 20
William Twine	Washing 918½ dozen towels in July, at 50 cents.....	.....	20 00
J. Bains	Witness before Committee on Agriculture, 3 days	6 00	459 25
	2 miles' travel	20	
Joseph Killian.....	Witness before Committee on Agriculture, 1 day	2 00	6 20
	12 miles' travel	1 20	3 20

A. C. Wiley.....	Witness before Committee on Agriculture, 1 day	2 00	2 20
	2 miles' travel	20	7 10
McKee, Fishback & Co	Daily Missouri Democrat to R. T. Van Horn	28 00	
Hudson Taylor	7 reams fancy French note paper	30 00	
	12 gross English patent steel pens	22 50	
	25 reams waste-paper	3 00	
	1 dozen boxes eagle pens	12 00	
	2 dozen boxes eagle pens	7 50	
	6 adhesive files		
T. W. Ferry	Stationery, 1st session 39th Congress		103 00
B. M. Boyer	do.....do.....do.....		60 11
W. A. Burleigh	do.....do.....do.....		50 61
W. H. Randall	do.....do.....do.....		35 89
Campbell & Son	do.....do.....do.....		32 46
	1 cylinder night-latch and 11 feet wove wire	6 40	
	6 papers tacks and 4 screw-drivers	3 00	
	6 dozen papers tacks and 6 tack hammers	11 10	
	4½ dozen papers tacks	11 04	
	16 gross screws, assorted, and 16 gimlets	12 28	
	4 pounds copper nails and 2 punches	4 30	
	80 pounds sheet brass, 1 dozen brass hooks, and 2 ventilators	47 30	
	1 dozen sail needles	30	
	500 pounds machine waste	130 00	
	1 spring wrench	1 25	
	1 conductor's wrench	2 50	
	1½ dozen hat and coat hooks	4 50	
	1 dozen Stubbs's files	1 90	
William Averill	Temporary clerk, pay-roll for July, 1866	150 00	235 87
A. J. Larnier	do.....do.....do.....	150 00	
V. Pulizzi	do.....do.....do.....	150 00	
J. Holcomb	do.....do.....do.....	125 00	
E. Cowan	do.....do.....do.....	125 00	
W. W. Chase	do.....do.....do.....	100 00	
J. S. Read	Folder, pay-roll for July, 1866	100 00	800 00
J. Simons	do.....do.....do.....	100 00	
T. Blague	do.....do.....do.....	100 00	
J. Sterling	do.....do.....do.....	100 00	
J. T. Chauncey	do.....do.....do.....	100 00	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
T. M. Killinger.....	Folder, pay-roll for July, 1866	\$84 00	
W. G. Brown	do.....do	84 00	
J. M. Shomo	do.....do	84 00	
A. H. Walcott	do.....do	84 00	
P. Ward.....	do.....do	84 00	
O. Peabody	do.....do	84 00	
De W. C. Lewis	do.....do	84 00	
H. Weaver	do.....do	84 00	
F. Irwin	do.....do	84 00	
E. Tuck	do.....do	84 00	
J. E. Hammond	do.....do	84 00	
D. A. Hull	do.....do	84 00	
J. William Pope	do.....do	84 00	
H. W. McGeorge	do.....do	84 00	
J. L. McKie	do.....do	84 00	
B. D. Peck	do.....do	84 00	
J. W. Pettit	do.....do	84 00	
W. S. Young	do.....do	84 00	
W. H. Boughter	do.....do	84 00	
W. R. Smith	do.....do	84 00	
William Davis	do.....do	84 00	
H. C. Sherrill	do.....do	84 00	
C. W. Linthurst	do.....do	84 00	
S. S. Strachan	do.....do	84 00	
William Cunningham	do.....do	84 00	
G. F. Colby	do.....do	84 00	
L. Bess	do.....do	84 00	
S. Malcomb	do.....do	84 00	
William Stringer	do.....do	84 00	
William Moran	do.....do	84 00	
J. De Saules	do.....do	70 00	
C. F. Rowe	do.....do	70 00	
C. D. Choate	do.....do	56 00	
P. B. Prince	do.....do	56 00	

S. Stelle	do	56 00
H. Baldwin	do	56 00
E. McConnell	do	56 00
T. Martin	do	55 80
P. Nolan	do	55 80
R. Watkins	do	55 80
F. C. Lugenbell	do	84 00
J. Dwyer	do	84 00
T. Branch	do	84 00
		\$3,859 40
C. Stebbins	Folder, pay-roll for July, 1866	100 00
A. J. Morey	do	100 00
S. G. Bugh	do	100 00
J. W. Nightingale	do	100 00
H. W. Morrison	do	100 00
P. H. Reinhard	do	100 00
P. Stevens	do	93 00
W. Dalton	do	93 00
		886 00
N. Carr	Folder, pay-roll for July, 1866	3 50
C. Wincher	do	33 65
O. V. Shomo	do	54 13
A. Shaw	do	60 00
J. Lambert	do	20 17
W. Tabler	do	36 35
H. B. Whitefoot	do	42 88
J. Harris	do	35 30
T. Tippetts	do	27 73
J. Knarb	do	19 12
C. M. Young	do	24 97
George Clift	do	15 75
O. Huguely	do	43 92
J. Daily	do	19 27
W. Langston	do	49 76
		486 50
Jacob D. Forney	Engineer, pay-roll	125 00
J. H. Knox	do	100 00
William B. Turner	do	100 00
H. S. Linker	do	100 00
J. H. Barker	do	62 00
C. P. Bundick	do	62 00

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
William Hutcheson	Engineer, pay-roll	\$62 00	\$735 00
J. H. Garges	do	62 00	
S. A. Wilkins	do	62 00	
J. H. Barker	Laborer, pay-roll 2d quarter 1866	36 40	182 00
C. P. Bundick	do	36 40	
William Hutcheson	do	36 40	
J. H. Garges	do	36 40	
S. A. Wilkins	do	36 40	
J. T. Johnson	Laborer, pay-roll for July, 1866	55 80	813 10
L. Saunders	do	55 80	
A. Dade	do	50 40	
T. King	do	55 80	
H. Hall	do	50 40	
T. P. Bell	do	55 80	
J. W. Lee	do	50 40	
L. Cartwright	do	50 40	
W. A. Duckett	do	50 40	
A. Bruce	do	55 80	
J. V. Johnson	do	55 80	
W. Twine	do	55 80	
S. Bruce, jr.	do	46 50	
A. Russell	do	62 00	
A. Hall	do	62 00	
William B. Atkinson	Page, pay-roll for July, 1866	56 00	
William Chapline	do	56 00	
P. McDevitt	do	56 00	
J. R. Davis	do	56 00	
J. Dyas	do	56 00	
W. Hill	do	56 00	
W. D. Lanston	do	56 00	
F. W. Lerner	do	56 00	

E. Merritt	do	56 00
W. E. Newman	do	56 00
S. H. Nealy	do	56 00
G. H. Seidmore	do	56 00
A. S. Pillsbury	do	56 00
W. C. Raymond	do	56 00
T. Slater	do	56 00
H. Stewart	do	56 00
R. E. Stevens	do	56 00
H. C. Wall	do	56 00
E. H. Willard	do	56 00
J. B. Moses	do	56 00
C. G. Burlingame	Riding page, pay-roll for July, 1866	28 00
F. P. James	do	56 00
A. T. Gardner	do	56 00
William E. Dean	Temporary mail boy, pay-roll for July, 1866	75 00
B. M. Van Kuren	do	75 00
J. Burnham	Capitol police, pay-roll for July, 1866	110 00
S. N. Hilton	do	110 00
J. W. Chandler	do	110 00
J. B. Clark, jr	Cartage of 155 loads documents, &c., August, 1866, at 50 cents	330 00
J. A. McKean	Clerk Committee on Commerce, July, 1866	77 50
E. Stevens	Clerk Committee for the District of Columbia, July, 1866	124 00
Ezra Davol	Clerk Select Committee on Freedmen, July 1 to July 28, 1866	124 00
Jessup Moore	688 reams Manilla paper, at \$2 25	112 00
	600 reams Manilla paper, at \$4 50	1,548 00
		2,700 00
Hudson Taylor	283,000 speech envelopes, at \$3 61	4,248 00
C. Dean	488 pounds twine for folding-room, at 55 cents	1,021 63
A. E. Ward	Services as watcher, &c., August, 1866	268 40
Jas. Saunders	Services as laborer, under resolution July 26, 1866, from December 4, 1865, to July 31, 1866, 240 days, at \$1 80	93 00
W. H. Hall	Services as laborer, under resolution July 26, 1866, from December 4, 1865, to July 31, 1866, 240 days, at \$1 80	432 00
G. W. Davies	Witness before committee on Provost Marshal General's Office, 7 days	432 00
	800 miles' travel	14 00
		80 00
		1,120 00
		140 00
		150 00
		330 00
		77 50
		124 00
		124 00
		112 00
		4,248 00
		1,021 63
		268 40
		93 00
		432 00
		432 00
		94 00

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. H. Fowle	Witness before Committee on the Judiciary, 7 days.....	\$14 00	\$22 00
	80 miles' travel.....	8 00	
Wm. B. Gendell.....	Witness before Committee on Agriculture, 4 days	8 00	8 60
	6 miles' travel.....	60	
F. & J. Rives	Reporting and publishing in Daily Globe, July, 1866, 549 $\frac{7}{8}$ columns proceedings of House of Representatives, at \$7 50		4,120 08
T. W. Price	20 reams printed official letter.....	190 00	
	27 reams printed official note.....	162 00	
	2 boxes	1 75	
	Freight.....	3 20	
T. W. Price.....	24 reams official note paper	144 00	35 95
	Box and freight	2 55	
Blanchard & Mohun	2 reams legal cap paper		146 55
W. & J. Allen	100 oak arm-chairs	700 00	
	Freight.....	60 00	760 00
Wm. Averill	Temporary clerk, pay-roll for August, 1866.....	150 00	
A. J. Larnier	do.....do.....	150 00	20 00
V. Pulizzi	do.....do.....	150 00	
J. Holcomb	do.....do.....	125 00	146 55
E. Cowan	do.....do.....	125 00	
W. W. Chase	do.....do.....	100 00	800 00
J. S. Read.....	Folder, pay-roll for August, 1866	100 00	
J. Simons.....	do.....do.....	100 00	100 00
T. Blague.....	do.....do.....	100 00	
J. T. Chauncey	do.....do.....	100 00	108 70
L. P. Buckley.....	do.....do.....	108 70	
J. S. Samson	do.....do.....	102 00	102 00
J. W. Pope	do.....do.....	102 00	
N. Joy.....	do.....do.....	102 00	

H. L. Bonsall	do	do	102 00
J. L. McKie	do	do	102 00
W. Cunningham	do	do	102 00
L. Bess	do	do	102 00
S. Malcomb	do	do	102 00
T. M. Killinger	do	do	102 00
DeW. C. Lewis	do	do	102 00
W. S. Young	do	do	102 00
J. G. Hammond	do	do	102 00
D. H. Hull	do	do	102 00
W. Davies	do	do	102 00
L. Harney	do	do	102 00
J. S. Campbell	do	do	102 00
P. Nolan	do	do	55 80
Folder, pay-roll for August, 1866.			2, 196 50
S. D. Lord	do	do	100 00
A. J. Morey	do	do	100 00
S. G. Bugh	do	do	100 00
J. W. Nightingale	do	do	100 00
H. W. Morrison	do	do	100 00
H. M. McGuire	do	do	100 00
P. H. Reinhard	do	do	100 00
Paul Stevens	do	do	93 00
H. D. V. Hazzard	do	do	93 00
Albert Shaw	do	do	24 30
O. Shomo	do	do	29 55
O. Huguely	do	do	26 45
Wm. Sangston	do	do	21 90
Wm. Tabler	do	do	1 70
J. Lambert	do	do	23 77
H. Whitefoot	do	do	25 77
T. Tippetts	do	do	24 75
C. M. Young	do	do	18 35
C. Wincher	do	do	30 50
J. Daily	do	do	19 15
J. Knarb	do	do	1 00
J. Harris	do	do	24 72
N. Carr	do	do	5 25
G. Clift	do	do	60
J. D. Forney	Engineer, pay-roll for August, 1866	do	125 00
			277 76

A.—Detailed statement of disbursements, &c.—Continued.

CONTINGENT EXPENSES OF

To whom paid.	For what object.	Amount.	Total.
J. S. Crawford	Engineer, pay-roll for August, 1866	\$100 00	\$735 00
Wm. B. Turner	do	100 00	
H. S. Linker	do	100 00	
J. H. Barker	do	62 00	
C. P. Burdick	do	62 00	
Wm. Hutchinson	do	62 00	
J. H. Garges	do	62 00	
S. A. Wilkins	do	62 00	
J. T. Johnson	Laborer, pay-roll	55 80	
L. Saunders	do	55 80	
A. Bruce	do	55 80	
J. V. Johnson	do	55 80	
W. Twine	do	55 80	
S. Bruce, jr.	do	46 50	
A. Russell	do	62 00	
A. Hall	do	62 00	
T. P. Bell	do	55 80	
T. King	do	55 80	
H. Hall	do	55 80	
J. Saunders	do	55 80	672 70
J. Reese	Services as upholsterer, August, 1866	100 00	100 00
J. Reese	Services as upholsterer, September, 1866	100 00	100 00
J. W. Lee	Laborer, pay-roll for August, 1866	40 00	
L. Cartwright	do	40 00	
R. Watkins	do	38 00	
S. Landrick	do	34 00	
J. B. Clark, jr	Cartage of 150 loads documents, &c., at 50 cents	152 00	152 00
M. C. Moores	42 buckets paste, August, 1866	75 00	75 00
M. C. Moores	36 buckets paste, September, 1866	63 00	63 00
J. De Saules	Services in folding-room, July 29 to September 30, 1866, 64 days, at \$2 50	54 00	54 00
A. E. Ward	Services as watcher, &c., September, 1866	160 00	160 00
E. Z. Steever	1 set brass oil-cans, oilers, and stand complete	90 00	90 00
		30 00	

	107½ pounds lead	21 50	
	Portage	50	
	1 set brass oil-cans, oilers, and stand complete	30 00	
	57 pounds lead	11 40	
	Express, portage, and box	2 00	
	Repairing pump, pipe, and calking joints	10 00	
			105 40
E. Z. Steever	7 pounds red lead	1 75	
	2 plumbers, 6 days, calking and repairing return bands and traps from steam coils	60 00	
	1 keg, 30 pounds, red lead	7 50	
	Portage and express	1 00	
	New washers, spring, and new packing and putty	4 00	
	2 patent water-closet cocks	18 00	
	2 plumbers and assistants, 4 days, repairing and fixing 5 water-closets and 6 urinals, and re-pairing members' water-closets	48 00	
Barker & Brintnall	807½ tons furnace coal, at \$7 96	140 25	
Barker & Brintnall	37 cords hickory wood, at \$9 50	6,430 32	
T. A. Beaton	4 horses and carryalls for carrying mails, August, 1866	351 50	
T. A. Beaton	4 horses and carryalls for carrying mails, September, 1866	310 00	
C. Lloyd	3 horses and carriages for Clerk's office, August, 1866	300 00	
C. Lloyd	3 horses and carriages for Clerk's office, September, 1866	232 50	
Ira Goodnow	Use of 1 horse and wagon, for September, 1866	225 00	
Kitty Bruce	Washing 32½ dozen towels, August, 1866, at 50 cents	75 00	
Kitty Bruce	Washing 28½ dozen towels, September, 1866, at 50 cents	16 12	
William Twine	Washing 10½ dozen towels, August, 1866, at 50 cents	14 46	
William Twine	Washing 12 dozen towels, September, 1866, at 50 cents	5 25	
C. B. Baker	Advertising proposals for fuel in Evening Star	6 00	
	Advertising proposals for stationery in Evening Star	10 50	
		77 00	
			87 50
W. H. & O. H. Morrison	1 May on Parliamentary Law	15 00	
	1 Kent's Commentaries, 4 volumes	20 00	
	1 May's and Molter's Pension Laws	5 00	
D. B. Clarke	1 box paraffine candles	1 00	
D. B. Clarke	Spirits of turpentine	6 75	
	3 dozen toilet soap		
J. R. Hunt	1 extra box	2 50	
	16 Globe boxes	56 00	
	1 lock	50	
			7 75

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. R. Hunt—Continued.....	1 extra box.....	\$5 00	
	1 box.....	2 00	
	1 extra box.....	5 00	
	1 box.....	3 50	
	Slat floor in document room.....	35 88	
	2 extra boxes.....	7 00	
	6 Globe boxes.....	21 00	
	2 extra boxes.....	12 00	
	1 extra box.....	10 00	
	Repairing shutter, document room.....	2 50	
	Repairing shutter, south wing.....	50	
	Repairing door of restaurant.....	50	
	Repairing chair.....	75	
	Sash lock, folding-room.....	75	
	1 chest for Committee on Public Expenditures.....	6 00	
	1 extra box.....	3 50	
	21 Globe boxes.....	73 50	\$248 38
R. H. Whittlesey	2 panes glass.....	40	
	3 panes glass.....	1 70	
	50 pounds lead, 1 gallon boiled oil.....	11 25	
	12½ pounds lead, 1 dozen Fitch's hair brushes.....	5 25	
	1 dozen bristle brushes.....	2 50	
	10 dozen bristle brushes.....	4 00	
	4 pounds putty, 5 glass, 1 putty knife.....	2 70	
	3 gallons alcohol.....	16 50	
	3 gallons coal oil, ½ dozen wicks.....	3 25	
	½ gallon alcohol and can, 1 ball.....	3 25	
	1 dozen lantern glasses and repairs.....	5 00	
	1 pane glass.....	75	
	2 panes glass.....	2 50	
	1 pane glass, 1 gallon alcohol.....	2 75	
	1 gallon turpentine, 2 pounds putty.....	1 40	
	— panes glass, 1 pound putty.....	60	63 80

Snow, Coyle & Co.....	Advertising proposals for stationery.....	.....	96 00
W. J. Murtagh & Co.....	Advertising proposals for stationery.....	.....	92 00
F. & J. Rives.....	9 sets Congressional Globe and Appendix, 23d to 38th Congress inclusive, 612 volumes, at \$5.....	.....	3, 060 00
J. W. Westfall.....	Capitol police, pay-roll for June, 1866.....	32 25	
J. Burnham.....	do.....do.....	110 00	
S. N. Hilton.....	do.....do.....	110 00	
J. W. Chandler.....	do.....do.....	41 70	
William Averill.....	Temporary clerk, pay-roll for September, 1866.....	150 00	293 95
A. J. Larnier.....	do.....do.....	150 00	
V. Pulizzi.....	do.....do.....	150 00	
J. Holcomb.....	do.....do.....	125 00	
E. Cowan.....	do.....do.....	125 00	
W. W. Chase.....	do.....do.....	100 00	
J. S. Read.....	Folder, pay-roll.....	100 00	800 00
J. Simons.....	do.....do.....	100 00	
T. Blague.....	do.....do.....	100 00	
J. T. Chauncey.....	do.....do.....	100 00	
L. P. Buckley.....	do.....do.....	100 00	
J. S. Samson.....	do.....do.....	90 00	
J. William Pope.....	do.....do.....	90 00	
N. Joy.....	do.....do.....	90 00	
H. L. Bonsall.....	do.....do.....	90 00	
J. L. McKie.....	do.....do.....	90 00	
S. B. Wilson.....	do.....do.....	90 00	
L. Bess.....	do.....do.....	90 00	
S. Malcomb.....	do.....do.....	90 00	
T. M. Killinger.....	do.....do.....	90 00	
DeW. C. Lewis.....	do.....do.....	90 00	
W. S. Young.....	do.....do.....	90 00	
J. E. Hammond.....	do.....do.....	90 00	
D. N. Hull.....	do.....do.....	90 00	
William Davies.....	do.....do.....	90 00	
L. Harney.....	do.....do.....	90 00	
J. S. Campbell.....	do.....do.....	90 00	
P. Nolan.....	do.....do.....	54 00	
S. D. Lord.....	Folder, pay-roll for September, 1866.....	100 00	1, 994 00
A. J. Morey.....	do.....do.....	100 00	
S. G. Bugh.....	do.....do.....	100 00	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. W. Nightingale.....	Folder, pay-roll for September, 1866.....	\$100 00	\$880 00
H. W. Morrison.....	do.....do.....	100 00	
H. M. Maguire.....	do.....do.....	100 00	
P. H. Reinhard.....	do.....do.....	100 00	
A. B. Farwell.....	do.....do.....	90 00	
J. D. V. Hazard.....	do.....do.....	90 00	
A. Shaw.....	Folder, pay-roll for September, 1866.....	6 60	139 65
H. Whitefoot.....	do.....do.....	21 25	
J. Lambert.....	do.....do.....	11 80	
J. Harris.....	do.....do.....	19 30	
O. Shomo.....	do.....do.....	23 35	
J. Daily.....	do.....do.....	60	
J. Knarb.....	do.....do.....	30	
C. Wincher.....	do.....do.....	24 75	
W. Sangston.....	do.....do.....	12 95	
T. Tippet.....	do.....do.....	3 80	
C. M. Young.....	do.....do.....	13 95	
O. Huguely.....	do.....do.....	1 00	
J. D. Forney.....	Engineer, pay-roll for September, 1866.....	125 00	725 00
J. S. Crawford.....	do.....do.....	100 00	
William B. Turner.....	do.....do.....	100 00	
H. S. Linker.....	do.....do.....	100 00	
J. H. Barker.....	do.....do.....	60 00	
C. P. Bundick.....	do.....do.....	60 00	
William Hutchinson.....	do.....do.....	60 00	
J. H. Garges.....	do.....do.....	60 00	
Samuel A. Wilkins.....	do.....do.....	60 00	
J. T. Johnson.....	Laborer, pay-roll for September, 1866.....	54 00	
L. Saunders.....	do.....do.....	54 00	
A. Bruce.....	do.....do.....	54 00	
H. McKenzie.....	do.....do.....	54 00	
William Twine.....	do.....do.....	54 00	

S. Bruce, jr.....	do.....	do.....	45 00
A. Russell	do.....	do.....	60 00
A. Hall	do.....	do.....	60 00
Thomas P. Bell.....	do.....	do.....	54 00
T. King.....	do.....	do.....	54 00
H. Hall	do.....	do.....	54 00
A. Dade	do.....	do.....	54 00
Philp & Solomons.....	10 reams fancy note paper.....	23 80	651 00
	1 ream fancy note paper.....	5 10	
	1 do.....do.....	4 85	
	1 do.....do.....	4 12	
	1 do.....do.....	3 02	
	1 do.....do.....	3 96	
	1 do.....do.....	2 84	
	1 ream bond commercial note paper.....	2 50	
	1 ream bond billet note paper.....	107 10	
	30 reams white commercial note paper.....	21 12	
	6,500 fancy envelopes.....	4 53	
	500 bond note envelopes, No. 1.....	2 50	
	500 bond note envelopes, No. 2.....	3 15	
	$\frac{1}{2}$ gross long tie envelopes.....	5 40	
	9 dozen.....do.....	4 95	
	9 do.....do.....No. 9.....	3 60	
	9 do.....do.....No. 10.....	48 00	
	1 do.....gold and rubber pens and pencils.....	43 08	
	1 do.....do.....do.....do.....	79 86	
	6 do.....do.....do.....do.....	50 82	
	6 do.....do.....do.....do.....	15 60	
	6 gold pens and telescope holders.....	19 50	
	6 do.....do.....do.....do.....	17 52	
	6 do.....and pencils in silver cases.....	29 46	
	6 gold and rubber pens and pencils, telescope holders.....	17 82	
	6 do.....do.....do.....do.....	18 24	
	6 do.....do.....do.....do.....	45 00	
	1 gross 4-inch flat glass inkstands.....	19 76	
	4 dozen Arnold's ink, quarts.....	9 24	
	3 do.....do.....pints.....	5 40	
	3 do.....do..... $\frac{1}{2}$ pints.....	6 00	
	3 do.....Guyot's carmine.....	4 95	
	1 do.....David's blue ink, quarts.....	12 72	
	6 do.....rubber pen-holders.....		

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
Philp & Solomons—Contin'd .			
	2 dozen fancy pen-holders.....	\$5 80	
	2 do.....do.....	7 92	
	2 do.....do.....	9 06	
	2 do.....do.....	9 06	
	2 do.....do.....	9 06	
	25 dozen short rubber propelling pencils.....	116 75	
	10 dozen long.....do.....	62 10	
	7 dozen Kelsey's ivory.....do.....	32 90	
	6 do.....do.....do.....	19 80	
	1 do...Faber's ivory.....do.....	19 32	
	1 do.....do.....do.....	17 68	
	24 patent gold and rubber pencils.....	40 80	
	12 patent gold and rubber pencils.....	18 60	
	‡ dozen diaries.....	10 00	
	Do.....	13 50	
	Do.....	12 00	
	Do.....	8 25	
	1 dozen diaries.....	12 75	
	‡ dozen diaries.....	9 25	
	Do.....	7 50	
	12 autograph books.....	20 76	
	Do.....do.....	14 40	
	Do.....do.....	16 20	
	Do.....do.....	32 40	
	Do.....do.....	33 00	
	12 scrap-books.....	14 88	
	Do.....	13 20	
	Do.....	13 20	
	3 portfolios.....	5 76	
	6.....do.....	35 52	
	8.....do.....	34 40	
	12.....do.....	51 00	
	3.....do.....	20 40	
	48 fancy folders.....	65 76	
	12 fancy folders, ivory.....	7 92	

24 folders, ivory.....	4 80
12 folders, Congress.....	18 88
36 folders, 9-inch, ivory.....	16 92
60 folders, 10-inch, ivory.....	33 60
23 Rodgers's scissors.....	34 96
24.....do.....	55 20
19.....do.....	27 93
3 dozen ready reference files.....	5 94
Do.....do.....	6 78
4 dozen erasing knives.....	12 76
2.....do.....ivory.....	7 92
4 dozen portmonnaies.....	15 00
Do.....	10 50
Do.....	15 00
Do.....	15 00
Do.....	9 50
Do.....	10 50
Do.....	24 00
1 dozen rubber rulers.....	9 00
Do.....	7 50
Do.....	6 50
Do.....	5 75
Do.....	15 00
Do.....	6 00
10 pounds artists' gum.....	8 20
300 pounds small soft twine.....	201 00
211 pounds small hard twine.....	141 37
2 gross rubber bands.....	4 50
1.....do.....	2 25
1.....do.....	2 25
1.....do.....	2 25
1.....do.....	2 25
1.....do.....	2 25
1.....do.....	2 25
1.....do.....	2 25
1.....do.....	2 25
1.....do.....	2 25
2.....do.....	4 50
2.....do.....	4 50
2.....do.....	4 50
2.....do.....	4 50

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
Philp & Solomons—Contin'd...	2 gross rubber bands	\$4 50	
	2.....do.....	4 50	
	2.....do.....	4 50	
	1 dozen Wostenholme's knives	27 72	
	1.....do.....	25 97	
	1.....do.....	20 00	
	1.....do.....	20 00	
	1.....do.....	42 58	
	3.....do.....	109 92	
	3.....do.....	75 38	
	2.....do.....	66 00	
	1.....do.....	21 75	
	1.....do.....	13 57	
	1.....do.....	13 93	
	1.....do.....	13 68	
	1.....do.....	30 40	
	1.....do.....	28 58	
	1 dozen Rodgers's knives.....	11 75	
	1.....do.....	45 00	
	1.....do.....	55 00	
	1.....do.....	36 00	
	8.....do.....	29 44	
	1.....do.....	20 00	
	1.....do.....	23 10	
	1 dozen Wostenholme's knives	40 00	
	200 packages blotting paper.....	20 00	
	1 ream laid note paper.....	5 00	
	Do.....do.....	2 60	
	25 gross Gillott's pens.....	34 25	
	25.....do.....	17 25	
	25.....do.....	26 00	
	5.....do.....	43 75	
	10 gross Eagle pens.....	22 50	
	1 dozen national bronze clips.....	9 00	

13 clips.....	6 76	
1 dozen paper weights, round.....	3 02	
1 $\frac{1}{2}$.....do..... mineral	7 75	
4.....do.....do	7 24	
6 dozen pencil sharpeners.....	3 30	
25 Robbins's eyelet punches.....	45 75	
200 boxes sand.....	2 00	
1 dozen pencils.....	3 00	
Do.....	3 69	
Do.....	3 00	
Do.....	18 90	
Do.....	14 50	
10 dozen boxes visiting cards.....	25 30	
2 $\frac{1}{2}$ dozen Atwater's files.....	16 42	
5 dozen boxes visiting cards.....	11 30	
123 skins parchment.....	67 65	
2,500 fancy envelopes.....	8 13	
12 pearl folders.....	14 40	
150 spools red tape.....	127 50	
25,000 white envelopes.....	123 75	
Do.....do.....	131 25	
Do.....do.....	151 25	
20,000 white envelopes.....	203 40	
19,500 buff.....do.....	94 68	
55,000 buff.....do.....	266 20	
14 dozen oval bronze paper weights.....	22 35	
20 gross Faber's hexagon pencils.....	188 80	
500 buff envelopes.....	2 42	
Add error in charges.....	52	
		\$4,807 94
Philp & Solomons.....	10 50	
1 die for Committee on Reconstruction, with handle.....	58 00	
8 reams flat cap.....	3 75	
500 envelopes.....	2 50	
Do.....	5 00	
1,000 envelopes.....	2 00	
8 glass inkstands.....	2 00	
4 rubber inkstands.....	21 78	
6,000 speech envelopes.....	1 00	
Altering dies from 1864 to 1865.....	10 00	
1 die, "revision of revenue system," with handle.....	10 00	
1 die, "internal revenue laws," with handle.....	10 00	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
Philp & Solomons—Contin'd..	1 ream legal cap	\$12 00	
	Do	9 00	
	2.....do.....letter.....	15 00	
	2.....do.....note.....	10 00	
	4 quires envelope.....	4 00	
	Altering 3 dies from 38 to 39	1 50	
	Altering 1 die from 63 to 64.....	50	
	4 dies to order, fitted with handles.....	42 00	
	1 scrap-book.....	2 50	
			\$223 03
E. Z. Steever	67½ feet gas pipe.....	23 63	
	Fittings and bushings.....	3 50	
	1 brass stop-cock.....	4 50	
	Pipe hooks.....	1 50	
	1 union and washer.....	3 00	
	Plaster of Paris, putty, and new washers.....	4 00	
	3 marble washbasins.....	15 00	
	2 plumbers and assistants, 5 days' time, and repairs	60 00	
	480 salamander grate bars.....	641 03	
	Freight and portage	35 05	
			791 21
F. H. Smith	Services as stenographer, September, 1866.....		300 00
R. J. Stevens	Services as clerk to Committee on Appropriations, August, 1866		180 00
R. J. Stevens	Services as clerk to Committee on Appropriations, September, 1866		180 00
Charles Deane.....	590 pounds twine, at 55 cents	324 50	
	568.....do.....60 cents	340 80	
	604 pounds Russia hemp, at 62 cents.....	377 50	
			1,042 80
H. G. Hayes.....	Services as assistant stenographer, August and September, 1866.....		610 00
H. Clay Stier	25 reams letter paper		143 75
	Capitol police, additional pay, 18th section, act July 28, 1866 :		
	W. A. Newman, from March, 1865, to May, 1866.....	231 03	
	P. D. Ankeny.....do.....do.....	174 53	
	W. J. Belshaw.....do.....do.....	174 53	
	John Bridges.....do.....do.....	174 53	

L. P. Blodgett	do	do	174 53
T. J. Beannee	do	do	174 53
J. Bement	do	do	174 53
J. B. Brown	do	do	174 53
B. W. Brown	do	do	174 53
S. A. Boyden	do	do	174 53
J. N. Bogart	do	to November 1865	108 53
E. T. Bowers	from January, 1866, to May, 1866		66 00
C. C. Casey	from May, 1865, to May, 1866		174 53
R. H. Emerson	do	do	174 53
J. Giberson	do	do	174 53
S. N. Hilton	do	November, 1865	108 53
A. K. Walker	from January, 1866, to May, 1866		66 00
N. R. Leavitt	from March, 1865, to May, 1866		174 53
T. Mullen	do	do	174 53
D. B. Mack	do	do	174 53
D. G. Mallory	do	do	174 53
John Plant	do	do	174 53
A. Ritter	do	do	20 53
A. B. Cate	from May, 1865, to May, 1866		154 00
R. Strong	from March, 1865, to May, 1866		174 53
J. M. Shepard	for March, 1865		20 53
T. W. Williams	from May, 1865, to January, 1866		110 00
W. E. Burton	from March, 1866, to May, 1866		44 00
W. P. Litcher	from March, 1865, to September, 1865		88 00
P. H. Rohrer	from November, 1865, to May, 1866		88 00
D. M. Tilton	from March, 1865, to May, 1866		174 53
J. W. Westfall	do	do	174 53
S. C. Wailes	from March, 1865, to January, 1866		132 00
W. G. Berry	from March, 1866, to May, 1866		44 00
E. Owens	from March, 1865, to May, 1866		174 53
G. W. Hall	from March, 1865, to May, 1866		127 46
R. J. Stevens	Additional twenty per cent. on salary, from December 18, 1865, to June 30, 1866		5, 073 74
C. B. Boynton	Additional twenty per cent. on salary, from December 4, 1865, to July 28, 1866		232 43
E. McPherson	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866		150 00
J. M. Barclay	do	do	956 00
W. K. Mehafeey	do	do	663 33
R. N. Sherman	do	do	573 60
E. Reilly	Additional twenty per cent. on salary, from March 4, 1865, to November 30, 1865		573 60
D. B. Thompson	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866		267 67
			478 00

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. Tisdale.....	Additional twenty per cent. on salary, from March 4, 1865, to April 30, 1866.	.....	\$338 66
J. B. Clarke, jr.....	Additional twenty per cent. on salary, from March, 4, 1865, to June 30, 1866	.....	318 66
William S. Irwin.....	do.....do.....	.....	318 66
Samuel D. Lieb.....	do.....do.....	.....	464 64
William D. Todd.....	do.....do.....	.....	464 64
George A. Bassett.....	do.....do.....	.....	573 60
J. A. Hall.....	Additional twenty per cent. on salary, from March 4, 1865, to December 15, 1865	.....	282 35
G. W. Johnes.....	Additional twenty per cent. on salary, from December 16, 1865, to June 30, 1866	.....	195 65
N. G. Ordway.....	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866.	.....	573 60
Thomas P. Cheney.....	do.....do.....	.....	318 66
William S. King.....	Additional twenty per cent. on salary, from March 4, 1865, to December 4, 1865	.....	325 90
J. Given.....	Additional twenty per cent. on salary, from December 5, 1865, to June 30, 1866.	.....	247 69
W. P. Anderson.....	Additional twenty per cent. on salary, from December 19, 1865, to June 30, 1866	.....	154 17
B. F. Coolidge.....	Additional twenty per cent. on salary, from December 13, 1865, to June 30, 1866	.....	158 87
W. H. McMonegal.....	Additional twenty per cent. on salary, from December 19, 1865, to June 30, 1866	.....	154 17
William Tudge.....	Additional twenty per cent. on salary, from March 4, 1865, to February 28, 1866.	.....	179 00
J. A. Renshaw.....	Additional twenty per cent. on salary, from March 4, 1865, to December 31, 1865	.....	149 00
A. W. Boggs.....	Additional twenty per cent. on salary, from January 1, 1866, to June 30, 1866.	.....	90 00
Ira Goodnow.....	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866	.....	573 60
S. E. Duffield.....	do.....do.....	.....	464 64
H. H. Sperry.....	do.....do.....	.....	464 64
O. S. Buxton.....	do.....do.....	.....	462 06
William Smelt.....	do.....do.....	.....	398 33
J. Hemple.....	do.....do.....	.....	398 33
A. G. Bradstreet.....	do.....do.....	.....	373 33
H. G. Russ.....	do.....do.....	.....	398 33
D. P. Brown.....	do.....do.....	.....	398 33
G. B. Wooldridge.....	do.....do.....	.....	318 66
C. Johnson.....	do.....do.....	.....	138 66
J. S. Samson.....	Additional twenty per cent. on salary, from June 1, 1865, to June 30, 1866.	.....	260 00
William S. Saunders.....	Additional twenty per cent on salary, from March 4, 1865, to June 30, 1866.	.....	343 66
J. Boyd.....	do.....do.....	.....	318 66
W. S. Young.....	Additional twenty per cent. on salary, from April —, 1865, to June 30, 1866.	.....	175 70
L. Harney.....	Additional twenty per cent. on salary, from December 4, 1865, to June 30, 1866.	.....	138 26

S. B. Wilson	do	do	do	do	do	138 26
J. S. Campbell	do	do	do	do	do	138 26
L. P. Buckley	do	do	do	do	do	138 26
Thomas Miller	do	do	do	do	do	138 26
R. A. McPherson	Additional twenty per cent. on salary, from April 1, 1865, to June 30, 1866.					284 66
N. Joy	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866.					300 86
B. F. Shaw	Additional twenty per cent. on salary, from December 4, 1865, to May 31, 1866.					118 26
J. H. Wilkinson	Additional twenty per cent. on salary, from April 1, 1866, to June 30, 1866.					60 00
H. L. Bonsall	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866.					276 60
V. E. Smalley	Additional twenty per cent. on salary, from December 15, 1865, to June 30, 1866.					271 20
L. J. Crouse	Additional twenty per cent. on salary, from December 11, 1865, to July 28, 1866.					184 00
E. Stevens	Additional twenty per cent. on salary, from December 4, 1865, to July 31, 1866.					192 00
E. S. Chapman	Additional twenty per cent. on salary, from December 4, 1865, to July 28, 1866.					189 60
W. H. McCartney	do	do	do	do	do	189 60
J. A. McKean	Additional twenty per cent. on salary, from December 19, 1865, to July 28, 1866.					177 60
J. T. Williams	Additional twenty per cent. on salary, from December 4, 1865, to April 30, 1866.					118 40
J. Marty	Additional twenty per cent. on salary, from May 1, 1866, to July 28, 1866.					71 20
W. B. Matchell	Additional twenty per cent. on salary, from December 4, 1865, to January 10, 1866.					30 40
H. F. Baker	Additional twenty per cent. on salary, from January 11 to June 4, 1866.					116 00
R. C. Walker	Additional twenty per cent. on salary, from December 14, 1865, to May 20, 1866.					126 40
A. S. Perham	Additional twenty per cent. on salary, from January 11, 1866, to July 23, 1866.					159 20
E. G. Bowdoin	do	do	do	do	do	189 60
E. Davol	Additional twenty per cent. on salary, from December 14, 1865, to July 28, 1866.					181 60
U. H. Painter	Additional twenty per cent. on salary, from December 4, 1865, to July 28, 1866.					189 60
William Averill	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866.					478 00
A. J. Larner	do	do	do	do	do	478 00
V. Pulizzi	do	do	do	do	do	478 00
J. Holcomb	do	do	do	do	do	398 33
E. Cowan	do	do	do	do	do	398 33
J. S. Read	do	do	do	do	do	318 66
J. Simons	do	do	do	do	do	318 66
J. W. Pope	do	do	do	do	do	289 80
G. W. Nokes	do	do	do	do	do	216 60
J. T. Chauncey	do	do	do	do	do	321 00
C. W. Linthurst	Additional twenty per cent. on salary, from May 1, 1865, to July 28, 1866.					156 60
B. D. Peck	Additional twenty per cent. on salary, from May 1, 1865, to June 30, 1866.					255 60
J. W. Pettit	Additional twenty per cent. on salary, from May 1, 1865, to July 28, 1866.					266 60
A. H. Walcott	Additional twenty per cent. on salary, from December 1, 1865, to July 28, 1866.					144 00
J. L. McKie	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866.					271 20
B. Ross	Additional twenty per cent. on salary, from November 5, 1865, to June 30, 1866.					119 40
T. D. Curtis	Additional twenty per cent. on salary, from December 5, 1865, to February 28, 1866.					51 60

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. Dwyer	Additional twenty per cent. on salary, from December 5, 1865, to July 28, 1866	.....	\$141 00
O. Peabody	Additional twenty per cent. on salary, from December 8, 1865, to July 28, 1866	.....	139 80
L. Bess	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866	.....	218 36
J. Whitcomb	Additional twenty per cent. on salary, from December 8, 1865, to January 31, 1866	.....	33 00
J. H. Hamilton	Additional twenty per cent. on salary, from December 8, 1865, to February 28, 1866	.....	49 80
B. Thomas	Additional twenty per cent. on salary, from December 11, 1865, to June 30, 1866	.....	121 20
S. S. Strachan	do.....do.....	.....	138 00
H. C. Nagle	Additional twenty per cent. on salary, from December 11, 1865, to February 28, 1866	.....	48 00
G. M. Holmes	Additional twenty per cent. on salary, from December 11, 1865, to January 13, 1866	.....	20 40
T. M. Kellinger	Additional twenty per cent. on salary, from December 13, 1865, to June 30, 1866	.....	120 00
F. Irwin	do.....do.....	.....	136 80
William Small	Additional twenty per cent. on salary, from December 13, 1865, to May 31, 1866	.....	100 80
William H. Boughter	Additional twenty per cent. on salary, from December 4, 1865, to July 31, 1866	.....	142 20
T. P. Drew	Additional twenty per cent. on salary, from December 15, 1865, to February 28, 1866	.....	45 60
T. J. O'Connor	Additional twenty per cent. on salary, from December 11, 1865, to January 15, 1866	.....	18 00
D. W. C. Lewis	Additional twenty per cent. on salary, from December 11, 1865, to June 30, 1866	.....	119 50
H. Weaver	Additional twenty per cent. on salary, from December 12, 1865, to July 28, 1866	.....	132 30
H. C. Sherrill	Additional twenty per cent. on salary, from December 4, 1865, to July 28, 1866	.....	142 20
E. Tucker	Additional twenty per cent. on salary, from November 1, 1865, to July 28, 1866	.....	160 20
W. R. Smith	Additional twenty per cent. on salary, from December 15, 1865, to July 28, 1866	.....	155 60
William Davis	Additional twenty per cent. on salary, from January 1, 1865, to June 30, 1866	.....	108 60
C. H. Coryell	Additional twenty per cent. on salary, from January 15, 1866, to April 30, 1866	.....	45 00
S. Ten Eyck	Additional twenty per cent. on salary, from January 8, 1866, to June 30, 1866	.....	104 40
P. Nolan	Additional twenty per cent. on salary, from November 1, 1865, to June 30, 1866	.....	87 12
C. H. Gibson	Additional twenty per cent. on salary, from February 1, 1866, to April 30, 1866	.....	53 40
D. A. Hull	Additional twenty per cent. on salary, from February 1, 1866, to June 30, 1866	.....	90 00
J. P. Peterson	Additional twenty per cent. on salary, from February 16, 1866, to February 28, 1866	.....	7 80
G. C. Poalton	Additional twenty per cent. on salary, from February 21 to April 30, 1866	.....	41 40
P. Ward	Additional twenty per cent. on salary, from February 1 to July 28, 1866	.....	106 80
H. Z. Knapp	Additional twenty per cent. on salary, from March 1 to June 30, 1866	.....	73 20
J. E. Hammond	do.....do.....	.....	73 20
William Moran	Additional twenty per cent. on salary, from December 4, 1865, to July 28, 1866	.....	29 46
C. F. Rowe	Additional twenty per cent. on salary, from December 8, 1865, to July 28, 1866	.....	79 00
F. Fuller	Additional twenty per cent. on salary, from December 11 to 31, 1865	.....	8 40

E. W. Morse	Additional twenty per cent. on salary, from April 1 to June 30, 1866	54 60
S. Malcomb	Additional twenty per cent. on salary, from May 1 to June 30, 1866	36 60
M. Flaherty	do	18 00
William Stringer	Additional twenty per cent. on salary, from June 1 to July 28, 1866	34 80
J. M. Shomo	Additional twenty per cent. on salary, from November 1, 1865, to July 28, 1866	162 00
C. Stebbins	Additional twenty per cent. on salary, from July 1, 1865, to July 31, 1866	237 60
A. J. Morey	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866	318 66
S. G. Bugh	do	318 66
J. W. Nightingale	Additional twenty per cent. on salary, from October 1, 1865, to June 30, 1866	180 00
W. B. Thompson	Additional twenty per cent. on salary, from March 4, 1865, to December 6, 1865	182 36
H. M. Maguire	Additional twenty per cent. on salary, from January 1 to June 30, 1866	120 00
Paul Stevens	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866	290 40
William Dalton	Additional twenty per cent. on salary, from December 19, 1865, to July 31, 1866	136 40
J. Q. Thompson	Additional twenty per cent. on salary, from February 1 to July 31, 1866	120 00
P. H. Reinhard	Additional twenty per cent. on salary, from May 1 to June 30, 1866	40 00
J. D. Forney	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866	398 33
W. B. Turner	Additional twenty per cent. on salary, from December 13, 1865, to June 30, 1866	132 59
J. H. Knox	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866	305 60
J. H. Barker	do	193 60
J. O'Brien	Additional twenty per cent. on salary, from March 4 to December 12, 1865	119 60
W. C. Smith	Additional twenty per cent. on salary, from March 4 to 31, 1865	11 20
J. H. Garges	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866	193 60
S. A. Wilkins	do	193 60
William Hutcheson	Additional twenty per cent. on salary, from September 26, 1865, to June 30, 1866	109 20
C. P. Bundick	Additional twenty per cent. on salary, from December 13, 1865, to June 30, 1866	80 00
H. S. Linker	Additional twenty per cent. on salary, from March 4, 1865, to December 18, 1865	228 22
J. T. Johnson	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866	174 24
T. P. Bell	do	186 60
L. Saunders	do	174 24
R. Watkins	Additional twenty per cent. on salary, from March 4, 1865, to July 31, 1866	151 20
A. Dade	Additional twenty per cent. on salary, from August 1, 1865, to July 28, 1866	130 27
H. Hall	Additional twenty per cent. on salary, from March 4, 1865, to July 28, 1866	126 43
J. W. Lee	Additional twenty per cent. on salary, from July 1, 1865, to July 28, 1866	108 31
L. Cartwright	Additional twenty per cent. on salary, from March 4, 1865, to July 28, 1866	126 32
W. A. Duckett	Additional twenty per cent. on salary, from December 4, 1865, to July 28, 1866	85 20
Thomas King	Additional twenty per cent. on salary, from April 1 to June 30, 1866	32 76
A. Bruce	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866	174 24
J. V. Johnson	Additional twenty per cent. on salary, from March 4, 1865, to July 31, 1866	194 56
William Twine	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866	174 24
A. Russell	do	177 48
A. Hall	do	193 60

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
S. Bruce, jr	Additional twenty per cent. on salary, from April 1, 1866, to June 30, 1866.....	.....	\$27 30
F. H. Smith	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866 .....	.....	968 00
H. G. Hayes	Additional twenty per cent. on salary, from June 1 to September 30, 1866.....	.....	244 00
Mrs. J. D. Ward	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866 .....	.....	290 40
J. R. Davis	Additional twenty per cent. on salary, from December 4, 1865, to July 28, 1866.....	.....	94 80
T. Slater	do.....do.....do.....	.....	94 80
G. L. Ordway	do.....do.....do.....	.....	94 80
William Chapline	do.....do.....do.....	.....	94 80
W. E. Newman	do.....do.....do.....	.....	94 80
H. H. Stewart	do.....do.....do.....	.....	94 80
F. W. Lawrence	do.....do.....do.....	.....	94 80
S. H. Healy	do.....do.....do.....	.....	94 80
P. B. Prince	do.....do.....do.....	.....	94 80
O. G. Burlingame	do.....do.....do.....	.....	94 80
H. Wade	do.....do.....do.....	.....	94 80
A. S. Pillsbury	do.....do.....do.....	.....	94 80
F. P. James	do.....do.....do.....	.....	94 80
W. C. Raymond	do.....do.....do.....	.....	94 80
W. B. Atkinson	do.....do.....do.....	.....	94 80
A. Gardner	Additional twenty per cent. on salary, from December 6, 1865, to July 28, 1866.....	.....	94 00
E. Merritt	Additional twenty per cent. on salary, from December 4, 1865, to July 28, 1866.....	.....	94 80
W. D. Lanston	do.....do.....do.....	.....	94 80
J. Dyas	do.....do.....do.....	.....	94 80
H. C. Wall	do.....do.....do.....	.....	94 80
C. D. Choate	Additional twenty per cent. on salary, from December 5, 1865, to July 28, 1866.....	.....	94 40
H. Baldwin	Additional twenty per cent. on salary, from December 7, 1865, to July 28, 1866.....	.....	93 60
E. H. Willard	Additional twenty per cent. on salary, from January 1 to July 28, 1866 .....	.....	83 60
E. D. McConnell	do.....do.....do.....	.....	83 60
S. Stelle	Additional twenty per cent. on salary, from January 8 to July 28, 1866.....	.....	83 60
J. Ogle	Additional twenty per cent. on salary, from December 4, 1865, to May 31, 1866 .....	.....	71 60
G. H. Scidmore	Additional twenty per cent. on salary, from February 20 to July 28, 1866 .....	.....	63 60
W. P. Copeland	Additional twenty per cent. on salary, from March 4, 1865, to January 15, 1866.....	.....	156 43
William E. Dean	Additional twenty per cent. on salary, from December 5, 1865, to June 30, 1866.....	.....	90 00
William Conn	Additional twenty per cent. on salary, from April 1 to June 30, 1866.....	.....	60 00

B. M. Van Keuren.....	Additional twenty per cent. on salary, from January 1 to June 30, 1866.....	90 00
W. F. Corbett.....	Additional twenty per cent. on salary, from March 4, 1865, to December —, 1865.....	142 61
W. E. Burton.....	Additional twenty per cent. on salary, from December — to December 31, 1865.....	6 38
B. G. Wheeler.....	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866.....	478 00
Joseph Reese.....	do.....do.....	318 67
G. F. Stevens.....	Additional twenty per cent. on salary, from March 4 to December 4, 1865.....	262 53
D. W. Bartlett.....	Additional twenty per cent. on salary, from March 4, 1865, to July 28, 1866.....	358 49
J. L. Swift.....	Additional twenty per cent. on salary, from December 11, 1865, to July 31, 1866.....	186 40
E. Spicer.....	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866.....	448 00
H. W. McGeorge.....	Additional twenty per cent. on salary, from December 6, 1865, to July 28, 1866.....	157 80
R. Meade.....	Additional twenty per cent. on salary, from January 20 to March 31, 1866.....	28 40
Theo. Blague.....	Additional twenty per cent. on salary, from March 4, 1865, to June 30, 1866.....	318 66
J. H. Hersey.....	do.....do.....do.....	232 84
Thomas Martin.....	Additional twenty per cent. on salary, from March 1 to July 31, 1866.....	55 08

Capitol police, additional pay, act July 28, 1866, section 18:

W. A. Newman.....	July and September, 1866.....	\$58 00
J. W. Westfall.....	do.....	50 00
P. D. Ankeny.....	do.....	44 00
J. Bement.....	do.....	44 00
J. Bridges.....	do.....	44 00
T. Beard.....	do.....	44 00
B. W. Brown.....	do.....	44 00
W. J. Belshau.....	do.....	44 00
S. A. Boyden.....	do.....	44 00
E. T. Bowers.....	do.....	44 00
W. G. Berry.....	do.....	44 00
S. W. Baxter.....	do.....	44 00
W. E. Burton.....	do.....	44 00
J. Burnham.....	do.....	44 00
C. C. Casey.....	do.....	44 00
J. W. Chandler.....	do.....	44 00
A. B. Cate.....	do.....	44 00
R. H. Emerson.....	do.....	44 00
J. Giberson.....	do.....	44 00
S. N. Hilton.....	do.....	44 00
N. K. Leavitt.....	do.....	44 00
T. Mullen.....	do.....	44 00
D. B. Mack.....	do.....	44 00
D. G. Mallory.....	do.....	44 00
E. Owens.....	do.....	44 00

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. Plant	Capitol police, additional pay, act July 28, 1866, section 18:		
J. P. Peterson	July and September, 1866	\$44 00	
P. H. Rohrer	do	44 00	
R. Strong	do	44 00	
D. M. Tilton	do	44 00	
A. K. Walker	do	44 00	
G. W. Hall	do	44 00	
		32 00	\$1,416 00
W. K. Mehaffey	Additional pay, act July 28, 1866, section 18:		
R. U. Sherman	From July 1 to September 30, 1866		108 00
D. B. Thompson	do		108 00
S. D. Leib	do		90 00
J. B. Clark, jr	do		88 32
George A. Bassett	do		60 00
J. Given	do		108 00
L. S. Morton	do		108 00
W. P. Anderson	do		87 00
B. F. Coolidge	do		72 00
W. H. McMonigal	do		72 00
A. W. Boggs	do		72 00
Walter Burr	do		45 00
Ira Goodnow	do		45 00
O. S. Buxton	do		108 00
E. Spicer	do		87 00
H. H. Sperry	do		90 00
J. Hemple	do		88 32
Wm. S. Saunders	do		75 00
D. P. Brown	do		75 00
John Boyd	do		75 00
R. A. McPherson	do		60 00
T. Miller	do		60 00
P. H. Hinton	From July 1 to July 28, 1866		18 26
Wm. Averill	do		18 26
	From July 1 to September 30, 1866		90 00

A. J. Larner	do	do	do	90 00
V. Pulizzi	do	do	do	90 00
J. Holcomb	do	do	do	75 00
W. W. Chase	do	do	do	60 00
W. L. Woods	do	do	do	90 00
L. D. Larrien	From December 19, 1865, to June 30, 1866			100 30
T. Branch	From July 1 to July 28, 1866			16 80
J. Simons	From July 1 to September 30, 1866			60 00
J. T. Chauncey	do	do	do	60 00
J. S. Samson	do	do	do	56 66
J. W. Pope	do	do	do	55 20
N. Joy	do	do	do	56 66
H. L. Bonsall	do	do	do	56 66
J. L. McKie	do	do	do	55 20
S. P. Wilson	do	do	do	36 26
L. Bess	do	do	do	55 20
S. Malcomb	do	do	do	55 20
T. M. Kellinger	do	do	do	55 20
D. W. C. Lewis	do	do	do	55 20
W. S. Young	do	do	do	55 20
J. E. Hammond	do	do	do	55 20
D. A. Hull	do	do	do	55 20
Wm. Davis	do	do	do	55 20
J. S. Campbell	do	do	do	56 66
P. Nolan	do	do	do	33 12
S. G. Bugh	do	do	do	60 00
J. W. Nightingale	do	do	do	60 00
H. W. Morrison	do	do	do	60 00
P. H. Reinhard	do	do	do	60 00
J. D. Forney	do	do	do	75 00
J. S. Crawford	From August 1 to September 30, 1866			40 00
H. S. Linker	From July 1 to September 30, 1866			60 00
J. H. Barker	do	do	do	36 80
C. H. Bundick	do	do	do	36 80
W. Hutcheson	do	do	do	36 80
J. H. Garges	do	do	do	36 80
S. A. Wilkins	do	do	do	36 80
Anna E. Ward	do	do	do	55 20
Joseph Reese	do	do	do	60 00
P. M. Devitt	From December 4, 1865, to July 28, 1866			94 80
J. T. Johnson	From July 1 to September 30, 1866			33 12

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
Lewis Saunders	Additional pay, act July 28, 1866, section 18:		\$33 12
Alex. Bruce	From July 1 to September 30, 1866		33 12
H. McKenzie	do		10 80
Wm. Twine	do		33 12
Sandy Bruce, jr	do		27 60
A. Russell	do		36 80
A. Hall	do		36 80
T. P. Bell	do		33 12
T. King	do		33 12
H. Hall	do		33 12
A. Dade	do		10 80
James Saunders	From September 1 to September 30, 1866		11 16
F. H. Smith	Additional twenty per cent. on salary, from August 1 to 31, 1866		184 00
F. & J. Rives	Additional twenty per cent. on salary, from July 1 to September 30, 1866		
	1,908 pages (in excess of 3,000 pages) on each of 4,924 copies Congressional Globe and Appendix, 1st session 39th Congress, supplied for 192 representatives and delegates, and including 100 copies for House library		
	Additional pay, 18th section act July 28, 1866:		18,789 98
Clinton Lloyd	From March 4, 1865, to June 30, 1866		368 76
H. N. Carter	From March 4, 1865, to June 30, 1866		421 79
R. J. Stevens	From December 18, 1865, to June 30, 1866		232 43
L. S. Morton	From March 4 to November 30, 1865		214 40
L. S. Morton	From December 1, 1865, to June 30, 1866		199 53
Walter W. Chase	From March 4, 1865, to June 30, 1866		185 38
J. M. Barclay	From July 1 to September 30, 1866		125 00
C. Lloyd	do		108 00
L. Harney	do		56 66
W. H. Smith	From March 4, 1865, to June 30, 1866		202 70
M. B. Brown	From August 1 to September 30, 1866		40 00
R. E. Stevens	From December 4, 1865, to July 28, 1866		94 80
George A. Brackett	From December 1, 1865, to December 18, 1865		13 82
J. H. Clements	From March 4 to 31, 1865		5 60
R. J. Bennett	From January 1 to April 30, 1866		72 00
Walter Burr	From January 1 to June 30, 1866		90 00
H. S. Linker	From December 18, 1865, to June 30, 1866		128 48

J. R. Briggs, jr.	From March 4, 1865, to June 30, 1866.	.....	478 00
G. W. Frank	From March 4 to November 30, 1866.	.....	268 00
J. V. Johnson	From August 1 to 31, 1866.	.....	11 16
J. R. Briggs, jr.	From July 1 to September 30, 1866.	.....	90 00
H. N. Carter	do	.....	90 00
W. D. Todd	do	.....	88 32
T. W. Evans	do	.....	55 20
D. W. Bartlett	From August 1 to September 30, 1866.	.....	40 00
S. D. Lord	do	.....	40 00
J. W. Pettit	do	.....	36 60
Julius De Saules	From July 29 to September 30, 1866.	.....	32 00
J. B. Clark, jr	Cartage of 150 loads of documents, boxes, &c., to departments, express office, and railroad depot.	.....	75 00
William Averill	Temporary clerk, pay-roll for October, 1866	.....	145 00
A. J. Larner	do	.....	145 00
V. Pulizzi	do	.....	145 00
J. Holcomb	do	.....	121 25
E. Cowan	do	.....	121 25
W. W. Chase	do	.....	97 50
J. W. Pettit	Services as folder, August, 1866.	.....	775 00
J. W. Pettit	Services as folder, September, 1866	.....	90 85
J. W. Pettit	Services as folder, October, 1866.	.....	88 00
T. W. Evans	Services as folder, from July 1 to September 30, 1866.	.....	90 85
Joseph S. Read	Folder, pay-roll for October, 1866	.....	269 70
J. Simons	do	97 50	
T. Blague	do	97 50	
J. T. Chauncey	do	97 50	
L. P. Buckley	do	97 50	
J. S. Samson	do	90 85	
J. W. Pope	do	90 85	
N. Joy	do	90 85	
H. L. Bonsall	do	90 85	
J. L. McKie	do	90 85	
S. B. Wilson	do	90 85	
L. Bess	do	90 85	
S. Malcomb	do	90 85	
T. M. Kellinger	do	90 85	
D. W. C. Lewis	do	90 85	
W. S. Young	do	90 85	
J. E. Hammond	do	90 85	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
D. A. Hull	Folder, pay-roll for October, 1866.....	\$90 85	\$2,087 46
William Davis	do.....do.....	90 85	
L. Harney	do.....do.....	90 85	
J. S. Campbell.....	do.....do.....	90 85	
P. Nolan	do.....do.....	55 51	
J. M. Shomo	do.....do.....	90 85	
S. D. Lord	Folder, pay-roll for October, 1866.....	97 50	864 20
A. J. Morey	do.....do.....	97 50	
S. G. Bugh	do.....do.....	97 50	
J. W. Nightengale	do.....do.....	97 50	
H. M. Maguire	do.....do.....	97 50	
P. H. Reinhard	do.....do.....	97 50	
A. B. Farwell.....	do.....do.....	90 85	107 60
J. D. V. Hazzard.....	do.....do.....	90 85	
Albert Shaw	Folder, pay-roll for October, 1866.....	5 60	
Henry Whitefoot	do.....do.....	11 10	
J. Lambert.....	do.....do.....	9 50	
J. Harris.....	do.....do.....	13 60	
O. Thomo.....	do.....do.....	11 35	54 00
William Tabler	do.....do.....	4 00	
C. Wincher	do.....do.....	13 85	
C. M. Young	do.....do.....	9 35	
William Langston	do.....do.....	10 00	
T. Tippetts.....	do.....do.....	9 50	
O. Huguely	do.....do.....	9 75	90 85
Mary C. Moores	36 buckets paste furnished folding-room in October, 1866.....	.....	
Anna E. Ward.....	Services as watcher and keeping fires in the furnaces under folding-room, October, 1866.....	.....	
J. D. Forney.....	Engineer, pay-roll for October, 1866.....	121 25	
J. S. Crawford	do.....do.....	97 50	
William B. Turner	do.....do.....	97 50	
H. S. Linker.....	do.....do.....	97 50	61 40
J. H. Barker	do.....do.....	61 40	

C. P. Bundick	do	61 40	720 75
William Hutcheson	do	61 40	
J. H. Garges	do	61 40	
S. A. Wilkins	do	61 40	
Somerville & Leitch	Repairing bucket and plunge of pump	5 95	
	Making 6 window fastenings	14 00	
	Repairing piston rings	6 05	
	1 $\frac{1}{4}$ angle valve	3 50	
	Making starting bar for pump	6 00	
	Repairing globe valve	1 70	
	50 $\frac{1}{4}$ iron washers	1 95	
	Do	1 95	
	Repairs on engine, valves, &c., 410 hours' time, at 50 cents	205 00	
	32 pounds cast-iron	2 56	
	20 pounds brass castings	10 00	
	16 pounds Babbitt metal	10 40	
	6 bolts and nuts to order	4 00	
	2 pounds steel	70	
	2 steel wrenches	6 00	
	24 bolts and nuts, turned heads	7 20	
	4 2-inch brass plugs	6 00	
	Planing steam chest	5 00	
	Use of 4 horses and carryalls for carrying mail, October, 1866, at \$10 per day	296 96	
	3 horses and carriages for Clerk's office, October, 1866, at \$2 50 per day	310 00	
	Laborer, pay-roll for October, 1866	232 50	
T. A. Beaton	do	55 51	
C. Lloyd	do	55 51	
J. T. Johnson	do	55 51	
L. Saunders	do	55 51	
T. P. Bell	do	55 51	
H. Hall	do	55 51	
A. Dade	do	55 51	
J. Glover	do	55 51	
A. Bruce	do	55 51	
H. McKinzie	do	55 51	
William Twine	do	55 51	
S. Bruce, jr	do	46 50	
A. Hall	do	61 40	
A. Russell	do	61 40	668 89
J. M. Barclay	Compensation as "journal clerk" under resolution of March 3, 1857, from April 1 to August 31, 1866	135 17	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
W. H. Smith	Services as messenger in House library, August, 1866 .....	.....	\$76 12
W. H. Smith	Services as messenger in House library, September, 1866 .....	.....	73 75
W. H. Smith	Services as messenger in House library, October, 1866 .....	.....	76 12
T. T. Fowler & Co.	14,612 pounds ice, August, 1866	\$109 59	
	9,493 pounds ice, September, 1866	71 20	
	7,250 pounds ice, October, 1866	54 37	
Kitty Bruce	Washing 26 ⁷ / ₈ dozen towels, October, 1866 .....	.....	235 16
William Twine	Washing 8 dozen towels for Clerk's office .....	.....	13 28
Blanchard & Mohun	20 reams octave note paper .....	.....	4 00
	35 dozen boxes boxes cut quills	58 00	
	10 dozen mucilage, 4 ounce bottles	262 50	
	10 dozen mucilage, 8 ounce bottles	25 00	
	50 pounds sealing wax	50 00	
	2 dozen scissors	90 00	
	Do	14 00	
	Do	19 00	
	1 dozen blotting pads	20 00	
	Do	21 00	
	Do	12 00	
	Do	7 80	
	Do	6 00	
	3 dozen knives	100 00	
	2 dozen knives	90 00	
	Do	54 00	
Dempsey & O'Toole	10,000 official envelopes	115 00	829 30
	50 gross medallion pens	35 00	
	6 dozen pen-wipers	12 30	
Joseph Reese	Services as upholsterer, October, 1866 .....	.....	162 30
J. W. Lee	Furniture, pay-roll for October, 1866 .....	.....	97 50
L. Cartwright	do	53 48	
R. Watkins	do	53 48	
S. Laudick	do	53 48	
	do	51 50	
			211 94

J. B. Clark, jr	Compensation for November, 1866.....	.....	5,184 85
John Harris.....	Compensation for November, 1866.....	.....	1,928 60
Oscar Thomo.....	Compensation for November, 1866 (police) .....	.....	3,443 00
William Langston	Cartage of 150 loads of documents, boxes, &c., delivered at departments, express offices, and railroad depots.....	.....	75 00
C. Wincher	Folder, pay-roll for November, 1866.....	5 25	
J. Lambert.....	do.....	8 25	
H. Whitefoot	do.....	7 50	
T. Tippetts.....	do.....	6 75	
C. M. Young.....	do.....	3 75	
William Tabler.....	do.....	6 75	
O. Huguely	do.....	6 00	
J. Daily	do.....	5 25	
G. Clift	do.....	1 50	
A. Shaw	do.....	2 25	
J. S. Read.....	Folder, pay-roll for November, 1866	97 50	61 50
J. Simons	do.....	97 50	
T. Blague.....	do.....	97 50	
J. T. Chauncey	do.....	97 50	
L. P. Buckley.....	do.....	97 50	
J. S. Samson	do.....	88 00	
J. William Pope.....	do.....	88 00	
N. Joy.....	do.....	88 00	
H. L. Bonsall	do.....	88 00	
J. L. McKie	do.....	88 00	
S. B. Wilson	do.....	88 00	
L. Bess	do.....	88 00	
S. Malcomb	do.....	88 00	
T. M. Kellinger	do.....	88 00	
D. W. C. Lewis	do.....	88 00	
W. S. Young	do.....	88 00	
J. E. Hammond.....	do.....	88 00	
D. A. Hull.....	do.....	88 00	
William Davis	do.....	88 00	
L. Harney.....	do.....	88 00	
J. S. Campbell.....	do.....	88 00	
J. M. Shomo	do.....	88 00	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
B. D. Peck	Folder, pay-roll for November, 1866	\$88 00	\$2,516 85
F. S. Irwin	do	88 00	
P. Nolan	do	53 80	
J. De Saules	do	88 00	
J. W. Pettit	do	88 00	
A. H. Walcott	do	73 75	
T. Martin	do	53 80	
Samuel D. Lord	Folder, pay-roll for November, 1866	97 50	858 50
H. N. Carter	do	97 50	
S. G. Bugh	do	97 50	
J. W. Nightingale	do	97 50	
H. W. Morrison	do	97 50	
H. M. Maguire	do	97 50	
P. H. Reinhard	do	97 50	
A. B. Farwell	do	88 00	
J. D. V. Hazzard	do	88 00	
Anna E. Ward	Services as watcher, keeping fires under folding-room, &c., November, 1866	88 00	90 85
J. De Saules	Services in folding-room, October, 1866	90 85	
Hudson Taylor	44,000 speech envelopes	158 84	440 42
	45,000 speech envelopes	162 45	
	25,000 speech envelopes	90 25	
	2,000 speech envelopes	7 22	
	5,000 speech envelopes	18 05	
	1,000 speech envelopes	3 61	42 00
Mary C. Moores	28 buckets paste furnished folding-room, November, 1866	10 50	
E. Z. Steever	1 14-inch fancy and gilt wash-bowl	2 00	
	Plaster of Paris, putty, alcohol, and whiting	15 00	
	2 plumbers, 1½ day's time, and work	1 88	
	2½ feet extra strong ½ lead pipe	1 80	
	3 pounds solder	10 00	
	2 plumbers, 1 day's time, and work	5 00	
	1 14-inch marble washbasin		

Putty, plaster of Paris, new washers, &c.....	2 50	
Plumber and assistant, 1 day's time, and work.....	7 00	
471 pounds sheet lead.....	94 20	
32½ pounds solder.....	19 50	
1 1¼-inch brass strainer.....	35	
1½ foot 1-inch galvanized water pipe.....	75	
9½ pounds ½-inch lead pipe.....	1 85	
Porterage and freight on lead.....	3 50	
2 plumbers, 3 days' time, and work.....	30 00	
1 1-inch fitting and one strip sheet iron.....	80	
5 heavy fancy 2-light brackets with globe-holders.....	63 00	
1 2-inch union and washers.....	3 00	
1 2-inch galvanized union and washers.....	1 60	
1 2-inch solid plug.....	1 25	
Putty, new washers, wire, plaster of Paris, &c.....	3 00	
3 pounds solder.....	1 80	
2 plumbers and assistants, 2 days' time, and work.....	24 00	
6 2-light pendants and fixing.....	30 00	
1 1-light pendant and fixing.....	3 50	
1 dozen burners and putting on.....	3 00	
1 dozen hooks.....	2 20	
4 ½ to ¾-bushings and 13 globe-holders.....	4 25	
Repairing brackets in post office.....	3 00	
2 fitters, 2 days' time, and work.....	20 00	
	381 43	374 18
	7 25	9 60
Credit by 72½ pounds lead cuttings.....	.....	.....
Advertising proposals for fuel, four times.....	145 00	.....
Temporary clerk, pay-roll for November, 1866.....	145 00	.....
do.....do.....do.....	145 00	.....
do.....do.....do.....	121 25	.....
do.....do.....do.....	121 25	.....
do.....do.....do.....	97 50	.....
Whitewashing in chambers and flues under hall of House of Representatives, November 3 to 24, 1866.....	.....	775 00
1 new iron-lined wheelbarrow.....	25 00	54 55
Repairing and lining wheelbarrow.....	10 00	35 00
J. W. Forney.....	.....	.....
William Averill.....	.....	.....
A. J. Larner.....	.....	.....
V. Pulizzi.....	.....	.....
J. Holcomb.....	.....	.....
E. S. Dana.....	.....	.....
W. W. Chase.....	.....	.....
William A. Duckett.....	.....	.....
W. H. Garges.....	.....	.....

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
Ira Goodnow.....	Use of 1 horse for October and November, 1866.....	\$122 00	\$197 00
	Use of 1 horse and wagon for November, 1866.....	75 00	
T. A. Beaton.....	Use of 4 horses and carryalls for carrying the mails, November, 1866.....		300 00
J. T. Johnson.....	Laborer, pay-roll for November, 1866.....	53 80	
L. Saunders.....	do.....do.....	53 80	
T. P. Bell.....	do.....do.....	53 80	
H. Hall.....	do.....do.....	53 80	
A. Dade.....	do.....do.....	53 80	
J. Berry.....	do.....do.....	53 80	
A. Bruce.....	do.....do.....	53 80	
H. McKenzie.....	do.....do.....	53 80	
William Twine.....	do.....do.....	53 80	
S. Bruce, jr.....	do.....do.....	45 00	
A. Hall.....	do.....do.....	59 50	
A. Russell.....	do.....do.....	59 50	
J. A. Bancroft & Co.....	1 30-inch terrestrial globe.....	275 00	648 20
	Box and packing.....	10 00	
Robert Black.....	2½ dozen extra fine chamois skins.....	25 00	285 00
	1½ dozen extra fine chamois skins.....	10 87	
	1 box oleine soap.....	8 70	
	1 box brown soap.....	9 50	
	11 boxes American castile soap.....	62 80	
	½ gross honey soap.....	9 00	
	½ gross honey soap.....	12 24	
	1 dozen glycerine soap.....	2 50	
	1 dozen glycerine soap.....	2 25	
	½ dozen violet soap, extra fine.....	3 00	
	½ dozen elder flower soap.....	3 00	
	2 dozen assorted bar soap.....	10 80	

W. K. McChaffey	Services as reading clerk, per resolution of March 3, 1857, for July, August, September, and October, 1866	114 00
W. H. Smith	Services as messenger in House Library, November, 1866	73 75
J. M. Barclay	Services as Journal clerk, per resolution of March 3, 1857, for September and October, 1866	53 53
T. Lindsay	Freight and expenses on 1 box from Boston	27 50
	Freight and expenses on 2 boxes from Philadelphia	1 75
A. Bruce	Washing 38½ dozen towels, November, 1866	29 25
J. G. Bennett	New York Herald furnished to—	19 37
	Hon. T. Stevens, December 7, 1865, to August 1, 1866	9 12
	William B. Allison, December 8, 1865, to August 1, 1866	9 08
	J. A. Nicholson, December 13, 1865, to August 1, 1866	8 88
	N. P. Banks, December 15, 1865, to August 1, 1866	8 80
	H. P. H. Bromwell, January 10, 1866, to August 1, 1866	7 80
	W. E. Niblack, December 3, 1865, to August 1, 1866	9 28
	R. T. Van Horn, December 18, 1865, to August 1, 1866	8 84
	George S. Boutwell, December 14, 1865, to August 1, 1866	10 40
William E. Dodge	Newspapers, 1st session 39th Congress	72 20
C. E. Baker	Furnishing the Independent to Hon. William B. Allison, from January 18 to April 19, 1866	50 00
G. Nokes	Pay-roll, work on furniture, November, 1866	88
J. Barnes	do	78 39
J. W. Lee	do	78 39
L. Cartwright	do	53 55
S. Landrick	do	53 55
R. Watkins	do	51 87
C. Davis	do	53 55
	do	25 78
W. Simmons	3½ days' services of bricklayer and laborer	21 00
	2 bushels cement	2 00
	6 days' services of bricklayer and laborer	36 00
	1 barrel lime	2 00
	2 loads sand	2 00
	2 loads bricks	9 32
	7 days' services of bricklayer and laborer	42 00
	1 barrel lime	1 75
	1 barrel cement	2 75
	1 load sand	1 00
Joseph Reese	Services as upholsterer, November, 1866	119 82
Ann Gardner	Pay-roll, work on furniture, for November, 1866, 13 days	97 50
	.....	15 60

394 78

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
Julia Snell	Pay-roll, work on furniture, for November, 1866, 13 days	\$15 60	\$39 60
Lucretia Espirita	do.....do..... 7 days.....	8 40	
Hudson Taylor	1 dozen knives	34 30	
	Do	23 60	
	Do	30 00	948 65
	Do	11 50	
	1½ gross carmine and blue pencils	27 50	
	45 reams letter paper	268 20	
	93½ reams note paper.....	384 19	
	½ dozen portemonnaies	11 50	
	Do	15 50	
	Do	11 75	
	Do	14 87	
	Do	13 00	
	Do	9 74	
	10,000 official envelopes	93 00	
Philp & Solomons	1 rubber and gold-pointed pen and holder	5 00	557 15
	18,000 envelopes.....	87 12	
	5,000 Oxford envelopes	25 00	
	100 reams thin Manilla	49 00	
	12 scrap books	29 64	
	Altering date on stamp.....	75	
	Altering date on two stamps	3 00	
	20 reams cap.....	151 40	
	500 buff envelopes	2 42	
	6 portfolios.....	25 80	
	40 reams note	122 00	
	Altering stamp	1 00	
	Die for hand stamp	5 00	
	Die for Agricultural Report, 1865.....	5 00	
	10 dozen boxes cards	24 70	
	2 dozen fancy penholders	20 32	

Ralph Hill	Stationery, 1st session 39th Congress	27 74
Moses Dillon	Additional pay, act July 28, 1866, section 18:	
J. Stroh	From March 4, 1865, to September 30, 1866	539 60
J. W. Clayton	From July 1 to September 30, 1866	85 50
H. W. Morrison	From March 4, 1865, to June 30, 1866	454 10
E. Giddings	From May 1, 1865, to June 30, 1866	266 00
D. Buck	From March 4, 1865, to March 31, 1866	187 63
E. McPherson	From March 4 to August 31, 1865	169 10
J. Sterling	From July 1 to September 30, 1866	171 00
J. W. Simons	From December 12, 1865, to July 31, 1866	144 40
C. E. T. Bailey	From December 4, 1865, to July 28, 1866	139 40
Wm. Hill	do	90 06
George W. Johns	do	90 06
J. W. Clayton	From July 1, 1866, to September 30, 1866	85 50
G. F. Colby	do	85 50
E. P. Faris	From February 1 to July 28, 1866	83 79
J. H. Hersey	From January 9 to June 30, 1866	80 94
H. M. Maguire	From July 1 to September 30, 1866	68 40
T. P. Cheney	do	57 00
Wm. B. Turner	do	57 00
J. S. Read	do	57 00
G. B. Wooldridge	do	57 00
L. Bollman	From May 17 to July 28, 1866	55 48
Harriet P. Phisk	From January 1 to July 28, 1866	54 44
Abraham Shoff	From March 4, 1865, to June 23, 1865	49 74
Wm. P. Anderson	From October 1 to November 30, 1866	45 60
Wm. H. Smith	From July 1 to September 30, 1866	43 70
D. W. Bartlett	From October 1 to November 30, 1866	38 00
J. S. Crawford	do	38 00
F. Mace	From December 14, 1865, to January 29, 1866	26 22
Joseph Burnham	From May 1 to June 30, 1866	20 90
A. J. Morey	From October 1 to October 31, 1866	19 00
Wm. H. Smith	From February 1 to March 31, 1866	5 60
J. D. Forney	Engineer, pay-roll for November, 1866	121 25
J. S. Crawford	do	97 50
Wm. B. Turner	do	97 50
H. S. Linker	do	97 50
J. H. Barker	do	59 50
C. P. Bundick	do	59 50
Wm. Hutcheson	do	59 50

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. H. Garges	Engineer, pay-roll for November, 1866	\$59 50	\$711 25
S. A. Wilkins	do	59 50	173 50
R. J. Stevens	Services as clerk to Committee on Appropriations, November, 1866 .....	.....	73 75
Wm. E. Dean	Services as mail-boy in House post office, August, 1866 .....	.....	73 75
B. M. Van Kuren	do .....	.....	73 75
Wm. Conn	do .....	.....	73 75
A. W. Boggs	Additional pay, act of July 28, 1866, section 18, from July 1 to September 30, 1866 .....	.....	42 75
.....	Compensation for December, 1866 .....	.....	5,376 97
.....	Do .....	.....	3,044 12
T. A. Beaton	Hauling 709 loads of documents for House of Representatives, from Aug. 1 to Dec. 1, 1866 .....	.....	3,354 50
J. B. Clark, jr	Hauling 155 loads documents, boxes, &c., December, 1866 .....	.....	77 50
F. & J. Rives	24 copies Congressional Globe and Appendix, 1st session 39th Congress, for each of five representatives from Tennessee and one from Pennsylvania, 144 copies, at \$6 each .....	.....	864 00
Wm. Averill	Temporary clerk, pay-roll for December, 1866	145 00	.....
A. J. Larnier	do	145 00	.....
V. Pulizzi	do	145 00	.....
J. Holcomb	do	121 25	.....
E. S. Dana	do	121 25	.....
W. W. Chase	do	97 50	.....
V. E. Smalley	Services as clerk to Committee on Military Affairs, from Dec. 3 to Dec. 31, 1866 .....	.....	775 00
A. S. Perham	Services as clerk to Committee on Invalid Pensions, from Dec. 3 to Dec. 31, 1866 .....	.....	167 64
J. H. Reilly	Services as clerk to Committee on Mines and Mining, from Dec. 3 to Dec. 31, 1866 .....	.....	112 54
J. L. Andem	Services as clerk to Committee on Foreign Affairs, from Dec. 3 to Dec. 31, 1866 .....	.....	112 54
J. S. Read	Folder, pay-roll for December, 1866	97 50	112 54
J. Simons	do	97 50	.....
T. Blague	do	97 50	.....
J. T. Chauncey	do	97 50	.....
J. Sterling	do	92 20	.....
T. M. Killinger	do	90 85	.....
J. E. Hammond	do	90 85	.....
S. Malcomb	do	90 85	.....
J. W. Pope	do	90 85	.....
J. L. McKie	do	90 85	.....

W. S. Young	do.	do.	do.	90 85
William Davis	do.	do.	do.	90 85
L. Bess	do.	do.	do.	90 85
D. A. Hull	do.	do.	do.	90 85
De W. C. Lewis	do.	do.	do.	90 85
F. S. Irwin	do.	do.	do.	90 85
B. D. Peck	do.	do.	do.	90 85
J. De Sauls	do.	do.	do.	90 85
A. H. Walcott	do.	do.	do.	90 85
J. M. Shomo	do.	do.	do.	90 85
William Cunningham	do.	do.	do.	84 99
W. H. Boughter	do.	do.	do.	84 99
S. S. Strachan	do.	do.	do.	84 99
E. P. Faris	do.	do.	do.	84 99
W. G. Brower	do.	do.	do.	84 99
W. R. Smith	do.	do.	do.	84 99
A. S. Ford	do.	do.	do.	84 99
E. Tucker	do.	do.	do.	84 99
William P. Anderson	do.	do.	do.	84 99
W. Moran	do.	do.	do.	84 99
E. Giddings	do.	do.	do.	84 99
B. Ross	do.	do.	do.	76 20
S. Ten Eyck	do.	do.	do.	73 27
J. P. Hodnutt	do.	do.	do.	70 34
J. M. Lindley	do.	do.	do.	73 27
P. Ward	do.	do.	do.	64 49
W. H. Harding	do.	do.	do.	61 54
J. H. Parish	do.	do.	do.	76 12
W. Johnson	do.	do.	do.	51 57
P. Nolan	do.	do.	do.	55 51
N. Fuller	do.	do.	do.	84 99
C. Brown	do.	do.	do.	57 45
C. Reed	do.	do.	do.	57 45
S. B. Owings	do.	do.	do.	57 45
T. Slater	do.	do.	do.	57 45
A. S. Pillsbury	do.	do.	do.	57 45
J. W. Pettit	do.	do.	do.	90 85
C. G. Burlingame	do.	do.	do.	57 45
S. H. Nealy	do.	do.	do.	57 45
P. B. Prince	do.	do.	do.	57 45
D. S. Bean	do.	do.	do.	84 99

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
E. Hilton	Folder, pay-roll for December, 1866.....	\$84 99	\$4,231 53
A. Shoff.....	do.....do.....	43 96	
C. Stebbins	Folder, pay-roll for December, 1866	97 50	766 70
H. N. Carter.....	do.....do.....	97 50	
S. G. Bugh	do.....do.....	97 50	
J. W. Nightingale.....	do.....do.....	97 50	
H. W. Morrison.....	do.....do.....	97 50	
H. M. Maguire.....	do.....do.....	97 50	
William P. Copeland.....	do.....do.....	90 85	
C. C. Campbell.....	do.....do.....	90 85	
William Moran.....	Services in folding-room, August, 1866 .....	.....	
Anna E. Ward	Services as watcher, &c., folding-room, December, 1866.....	.....	
J. D. Forney	Engineer, pay-roll for December, 1866.....	121 25	90 85
J. T. Miller.....	do.....do.....	97 50	
William B. Turner.....	do.....do.....	97 50	
H. S. Linker	do.....do.....	97 50	
J. H. Barker	do.....do.....	61 40	
C. P. Bundick	do.....do.....	61 40	
William Hutcheson	do.....do.....	61 40	
J. H. Garges	do.....do.....	61 40	
S. A. Wilkins	do.....do.....	61 40	
H. Lyons	do.....do.....	27 73	
E. Z. Steever	10 pounds red lead.....	2 50	748 48
	1 spring-bottom stop-cock for urinal.....	3 50	
	12 pounds solder.....	7 20	
	Washers for couplings and putty.....	4 75	
	2 plumbers and assistants, 3 days' time, and work	36 00	
	2 marble wash-bowls.....	10 00	
	Putty, plaster of Paris, and washers.....	5 50	
	Pipe hooks, fittings, and screws	4 50	
	1 globe valve.....	4 00	

1 lever spring draw-cock	3 25	
87 feet galvanized water pipe	47 85	
2 water-closet cocks for urinals	12 00	
1 1/4-inch socket and new springs for cocks	4 50	
2 plumbers and assistants, 5 days' time, and work	60 00	
1 porcelain shade, chimney, and holder	3 00	
1 porcelain shade, burner, and fixings	4 50	
Time and work calking and stopping leaks in water pipe	8 00	
2 large porcelain shades	8 00	
2 shade holders	2 00	
2 chimneys	75	
1 burner and holder	1 50	
1 angle valve	4 00	
1 1/4 union and washers	2 50	
1 1-inch coupling and fittings	2 40	
Brass springs, putty, and washers	5 00	
2 plumbers and assistants, 3 days' time, and work	36 00	
2 portable drop-lights, complete	28 00	
1 portable drop-light, complete	14 00	
14 feet gas pipe	4 20	
Fittings and hooks	2 00	
1 double swing-joint bracket, and putting up	2 50	
1 gas fitter and assistant, 1 day's time, and work	7 00	
1 portable drop-light	14 00	
33 cords hickory wood, at \$9 50	354 90	
1/2 dozen plastering brushes	313 50	
1 2-foot German silver-bound rule	8 50	
1 pair cast-steel tongued calipers	4 00	
1 pair cast-steel tongued dividers	1 75	
4 horses and carryalls for carrying the mails of the House of Representatives, December, 1866	4 25	
3 horses and carriages for Clerk's office for November, 1866	18 50	
1 horse and wagon for December, 1866	310 00	
1 saddle horse for December, 1866	225 00	
Laborer, pay-roll for December, 1866	77 50	
do	62 00	
do	55 51	
do	55 51	
do	55 51	
do	46 50	
do	61 40	
A. Bruce		
H. McKenzie		
William Twine		
S. Bruce, jr		
A. Hall		
Barker & Brintnall		
L. H. Schneider		
Thomas A. Beaton		
Clinton Lloyd		
Ira Goodnow		

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
A. Russell	Laborer, pay-roll for December, 1866	\$61 40	
J. T. Johnson	do.....do.....	55 51	
L. Saunders	do.....do.....	55 51	
T. P. Bell.....	do.....do.....	55 51	
H. Hall.....	do.....do.....	55 51	
A. Dade	do.....do.....	55 51	
J. Berry	do.....do.....	55 51	
J. W. Lee	do.....do.....	51 93	
L. Cartwright	do.....do.....	51 93	
E. C. Younger	do.....do.....	51 93	
R. E. Boston.....	do.....do.....	51 93	
T. Martin.....	do.....do.....	51 93	
A. Simms.....	do.....do.....	51 93	
Harriet P. Phisk.....	Services in ladies' retiring room, December, 1866		\$980 47
H. G. Hayes	Services as assistant stenographer, per resolution of July 16, 1866, October, November, and December, 1866.....		46 50
E. Clinton & Co.....	5 dozen hair brushes	60 00	881 50
	2 dozen hat brushes.....	12 00	
	2 dozen hat brushes.....	7 00	
	2 dozen root cloth brushes	16 00	
	6 dozen buff combs	48 00	
	2 dozen nail brushes	18 00	
	2 dozen ladies' brushes.....	10 00	
	3 dozen feather dusters	120 00	
	4 dozen whisks.....	20 00	
	2 dozen sash tools	6 00	
	$\frac{1}{2}$ dozen stencil plates.....	2 00	
	2 dozen flat varnish ex	10 80	
	$\frac{1}{2}$ dozen bath brushes.....	9 00	
	2 dozen ex. sweeping brushes.....	84 00	
	$\frac{1}{2}$ dozen whisk window brushes.....	1 50	
	$\frac{1}{2}$ dozen whisk window brushes.....	1 50	
	6 dozen buff combs.....	48 00	
			509 80

D. C. Forney.....	Advertising proposals for fuel.....	12 00	116 00
	Advertising proposals for stationery.....	104 00	
C. S. Mark.....	Attendance as witness before Committee on the Judiciary, 2 days.....	4 00	
	1,054 miles' travel.....	105 40	
J. S. Myers.....	Attendance as witness before Committee on the Judiciary, 2 days.....	4 00	109 40
	1,054 miles' travel.....	105 40	
P. G. Gray.....	Attendance as witness before Committee on the Judiciary, 2 days.....	4 00	109 40
	1,054 miles' travel.....	105 40	
W. H. Smith.....	Services as messenger in House library, December, 1866.....		109 40
W. K. McHaffy.....	Compensation as reading clerk, November and December, 1866, per resolution March 3, 1857.....		76 12
George T. Bassett.....	12 gross parlor matches.....		57 00
S. D. Leib.....	12 copies McPherson's Manual for 1866, for the House library.....		42 00
A. Gray.....	15 pounds tobacco.....		12 00
E. P. Brooks.....	Attendance before Committee on New Orleans Riots, &c., 1 day.....	2 00	5 25
	2 miles' travel.....	20	
S. McKee.....	Newspapers, 2d session 39th Congress.....		2 20
E. Hise.....	do.....do.....		50 00
J. F. Starr.....	Newspapers, 1st session 39th Congress.....		50 00
J. F. Starr.....	Newspapers, 2d session 39th Congress.....		50 00
C. H. Winfield.....	do.....do.....		50 00
H. Ward.....	do.....do.....		50 00
C. Denison.....	do.....do.....		50 00
E. B. Washburne.....	do.....do.....		50 00
K. V. Whaley.....	do.....do.....		50 00
J. D. Baldwin.....	do.....do.....		50 00
H. McCullough.....	do.....do.....		50 00
E. Cooper.....	do.....do.....		50 00
S. T. Holmes.....	do.....do.....		50 00
M. Strouse.....	do.....do.....		50 00
J. H. Farquhar.....	do.....do.....		50 00
J. R. Kelso.....	do.....do.....		50 00
J. L. Dawson.....	do.....do.....		50 00
F. Thomas.....	do.....do.....		50 00
T. A. Plants.....	do.....do.....		50 00
A. Cobb.....	do.....do.....		50 00
E. N. Hubbell.....	do.....do.....		50 00

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
B. Van Horn.....	Newspapers, 2d session 39th Congress.....	.....	\$50 00
J. W. Hunter.....	do.....do.....	.....	50 00
A. J. Rogers.....	do.....do.....	.....	50 00
C. T. Hulburd.....	do.....do.....	.....	50 00
P. Baxter.....	do.....do.....	.....	50 00
M. R. Thayer.....	do.....do.....	.....	50 00
D. Hubbard.....	do.....do.....	.....	50 00
E. R. Eckley.....	do.....do.....	.....	50 00
R. E. Trowbridge.....	do.....do.....	.....	50 00
A. A. Barker.....	do.....do.....	.....	50 00
W. A. Darling.....	do.....do.....	.....	50 00
H. Price.....	do.....do.....	.....	50 00
S. Clarke.....	do.....do.....	.....	47 22
G. V. Lawrence.....	do.....do.....	.....	47 22
J. A. Bingham.....	do.....do.....	.....	47 22
H. Van Aernam.....	do.....do.....	.....	47 22
J. G. Bennett.....	do.....do.....	.....	47 22
D. W. Gooch.....	Daily Herald, from July 30, 1866, to July 31, 1867.....	.....	14 00
William B. Atkinson.....	Newspapers, 2d session 38th Congress.....	.....	10 00
William Chapline.....	Page, pay-roll for December, 1866.....	.....	.....
William Hill.....	do.....do.....	\$57 45	.....
William C. Raymond.....	do.....do.....	57 45	.....
C. M. Newman.....	do.....do.....	57 45	.....
W. D. Lanston.....	do.....do.....	57 45	.....
F. W. Larner.....	do.....do.....	57 45	.....
J. B. Moses.....	do.....do.....	57 45	.....
H. H. Stewart.....	do.....do.....	57 45	.....
R. E. Stevens.....	do.....do.....	57 45	.....
C. D. Choate.....	do.....do.....	57 45	.....
H. Baldwin.....	do.....do.....	57 45	.....
G. H. Seidmore.....	do.....do.....	57 45	.....
P. Devitt.....	do.....do.....	57 45	.....
William B. Dailey.....	do.....do.....	57 45	.....
E. McConnell.....	do.....do.....	57 45	.....
S. Stelle.....	do.....do.....	57 45	.....

S. C. Stailey.....	do.....	57 45
F. S. Evans.....	do.....	57 45
G. C. Squires.....	do.....	57 45
Temporary mail boy, pay-roll for September, 1866.....		1,149 00
B. M. Van Keuren.....	do.....	73 75
William E. Dean.....	do.....	73 75
William Conn.....	do.....	73 75
Temporary mail boy, pay-roll for quarter ending December 31, 1866.....		221 25
B. M. Van Keuren.....	do.....	221 25
William E. Dean.....	do.....	221 25
William Conn.....	do.....	221 25
C. E. T. Bailey.....	Services as page in office of House of Representatives, December 3 to 31, 1866.....	663 75
C. Denison.....	Stationery, 1st session 39th Congress.....	57 45
C. H. Winfield.....	Stationery, 2d session 39th Congress.....	63 95
J. A. Bingham.....	do.....	42 55
Dempsey & O'Toole.....	14 dozen pen wipers.....	38 96
J. R. Hunt.....	1 walnut check case for Sergeant-at-arms:.....	28 70
Clerk's office:		
	Making ice box.....	20 50
	Scaffolding.....	34 38
	Making and putting down carpet strips.....	11 00
	Drilling holes in floor.....	9 25
	Repairs (stable).....	4 00
	Repairs, washstand.....	2 00
	2 straight edges.....	75 75
	Repairing 2 fire screens.....	1 25
	Repairing 3 chairs.....	2 00
	Moving safe and altering counter.....	17 00
	Handle to ice axe.....	25 25
	Altering table.....	6 00
	Hall, House of Representatives:	
	Hanging sash.....	4 00
	Repairing floor (gallery).....	3 75
	Do.....	3 50
	Repairing desks, &c.....	27 85
	Repairing lounge.....	88 88
	Repairing doors and hinges for same.....	2 00
	Repairing sofa.....	75 75
	2 locks.....	1 00
	Escutcheons and knobs for desk.....	2 50

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. R. Hunt—Continued.....	Lock for reporter's gallery.....	\$0 50	
	60 feet walnut carpet strips.....	3 60	
	Folding-room:		
	1 large door.....	8 50	
	Repairing door.....	1 00	
	Ledger case.....	21 10	
	Case pigeon holes.....	6 00	
	Repairs for post office.....	12 00	
	Branch post office:		
	1 case 78 pigeon holes.....	39 00	
	Partition.....	21 81	
	2 large drawers.....	6 00	
	1 large drawer.....	2 00	
	Iron brackets.....	3 00	
	Drilling holes.....	3 00	
	Committee on Naval Affairs:		
	Repairing hat rack.....	1 00	
	1 lounge.....	1 00	
	Clerk's office:		
	1 chest with tills.....	8 00	
	30 boxes.....	105 00	
	Repairing hat rack for Committee on Military Affairs.....	1 00	
	2 boxes for Sergeant-at-arms.....	7 00	
			\$404 87
E. Lilly.....	Making 2 window awnings.....		30 00
W. A. Newman.....	Capital police: Additional pay, section 18, act of July 28, 1866.....	27 55	
J. W. Westfall.....	do.....do.....do.....	23 75	
J. Bement.....	do.....do.....do.....	20 90	
J. Bridges.....	do.....do.....do.....	20 90	
T. A. Boyden.....	do.....do.....do.....	20 90	
B. W. Brown.....	do.....do.....do.....	20 90	
W. J. Belshaw.....	do.....do.....do.....	20 90	
T. J. Beard.....	do.....do.....do.....	20 90	
E. T. Bowers.....	do.....do.....do.....	20 90	
W. G. Berry.....	do.....do.....do.....	20 90	

S. W. Barter	do	do	20 90
W. E. Burton	do	do	20 90
J. Burnham	do	do	20 90
C. C. Casey	do	do	20 90
J. W. Chandler	do	do	20 90
A. B. Cate	do	do	20 90
R. H. Emerson	do	do	20 90
J. Giberson	do	do	20 90
S. N. Hilton	do	do	20 90
N. K. Leavitt	do	do	20 90
T. Mullin	do	do	20 90
D. B. Mack	do	do	20 90
D. G. Mallory	do	do	20 90
E. Owens	do	do	20 90
J. Plant	do	do	20 90
J. B. Peterson	do	do	20 90
P. H. Rohrer	do	do	20 90
G. Sneed	do	do	20 90
R. Strong	do	do	20 90
D. M. Tilton	do	do	20 90
A. K. Walker	do	do	20 90
G. W. Hall	do	do	15 20
672 60			
Additional pay, section 18, act of July 28, 1866:			
John Bailey	From March 4, 1865, to September 30, 1866	do	539 60
G. W. Matthews	From March 4, 1865, to September 30, 1866	do	539 60
Ferris Finch	From August 1, 1865, to September 30, 1866	do	389 50
T. Stevens, jr	From December 1, 1865, to November 30, 1866	do	342 00
V. E. Smalley	From December 11, 1865, to July 28, 1866	do	261 06
S. B. Wells	From December 4, 1865, to September 30, 1866	do	188 35
W. L. Woods	From December 14, 1865, to June 30, 1866	do	187 73
J. Simpson	From March 4 to December 12, 1865	do	176 96
W. Cunningham	From May 1, 1865, to June 30, 1866	do	130 34
W. Cunningham	From July 1 to August 31, 1866	do	35 34
W. G. Brower	From December 14, 1865, to July 28, 1866	do	128 42
J. De Saules	From December 4, 1865, to July 28, 1866	do	112 50
R. J. Stevens	From July 1 to September 30, 1866	do	102 60
W. K. Mehaffey	From October 1 to December 31, 1866	do	102 60
William Wright	From May 1 to September 30, 1865	do	95 00
J. B. Moses	From December 4, 1865, to July 28, 1866	do	90 06
D. B. Thompson	From October 1 to December 31, 1866	do	85 50

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
J. Bailey.....	Additional pay per section 18 act of July 28, 1866:		\$85 50
E. Spicer.....	From October 1 to December 31, 1866.....		85 50
S. D. Leib.....	do.....do.....		83 79
L. S. Morton.....	do.....do.....		82 65
H. G. Russ.....	From July 1 to September 30, 1866.....		71 25
J. D. V. Hazzard.....	From August 1 to November 30, 1866.....		69 54
H. W. Morrison.....	From October 1 to December 31, 1866.....		57 00
H. M. Maguire.....	do.....do.....		57 00
W. W. Chase.....	do.....do.....		57 00
S. B. Wells.....	do.....do.....		57 00
L. P. Buckley.....	From July 1 to September 30, 1866.....		55 35
William Davis.....	From October 1 to December 31, 1866.....		52 44
Anna E. Ward.....	do.....do.....		52 44
A. B. Farwell.....	From September 1 to November 30, 1866.....		51 87
E. S. Dana.....	From November 1 to December 31, 1866.....		47 50
B. D. Peck.....	From July 1 to 28, 1866.....		15 96
B. Ross.....	From December 5 to 31, 1866.....		14 48
S. E. Duffield.....	From July 1 to September 30, 1866.....		83 90
Joseph Reese.....	Services as upholsterer in House of Representatives, December, 1866.....		97 50
P. H. Griswold.....	Additional pay per section 18 act of July 28, 1866, from April 1 to June 30, 1866.....		51 87
J. Harris.....	Folder, pay-roll for December, 1866.....	\$2 80	
C. Shomo.....	do.....do.....	6 49	
W. Sangston.....	do.....do.....	4 95	
C. Wincher.....	do.....do.....	6 60	
J. Lambert.....	do.....do.....	10 48	
H. Whitefoot.....	do.....do.....	6 00	
T. Tippetts.....	do.....do.....	5 40	
C. M. Young.....	do.....do.....	3 00	
W. E. Bannerman.....	do.....do.....	5 00	
O. Huguely.....	do.....do.....	3 10	
J. Daily.....	do.....do.....	5 05	
G. Clift.....	do.....do.....	2 30	
A. Shaw.....	do.....do.....	1 35	

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid.	For what object.	Amount.	Total.
F. W. Larner	Additional pay per section 18 act of July 28, 1866:	\$11 02	
J. B. Moses	Page, pay-roll for quarter ending December 31, 1866.	11 02	
H. Stewart	do.....do.....	11 02	
R. E. Stevens	do.....do.....	11 02	
C. D. Choate	do.....do.....	11 02	
H. Baldwin	do.....do.....	11 02	
G. H. Seidmore	do.....do.....	11 02	
P. Devitt	do.....do.....	11 02	
William B. Daily	do.....do.....	11 02	
E. D. McConnell	do.....do.....	11 02	
S. Stelle	do.....do.....	11 02	
S. C. Stailey	do.....do.....	11 02	
F. S. Evans	do.....do.....	11 02	
G. C. Squires	do.....do.....	11 02	\$220 40
B. M. Van Keuren	Additional pay per section 18 act of July 28, 1866:	88 50	
William E. Dean	Temporary mail boy, pay-roll for quarter ending December 31, 1866	88 50	
William Conn	do.....do.....	88 50	256 50
T. Blague	Additional pay per section 18 act of July 28, 1866:		
J. Simons	From October 1 to December 31, 1866		57 00
J. W. Pettit	do.....do.....		57 00
T. M. Kellinger	do.....do.....		52 44
D. H. Hull	do.....do.....		52 44
W. S. Young	do.....do.....		52 44
J. De Saules	do.....do.....		52 44
J. E. Hammond	do.....do.....		52 44
L. Bess	do.....do.....		52 44
J. W. Pope	do.....do.....		52 44
De W. C. Lewis	do.....do.....		52 44
J. M. Shomo	do.....do.....		52 44

S. Malcomb	do	do	52 44
B. D. Peck	do	do	53 77
F. Irwin	From November 1 to December 31, 1866		34 77
A. H. Walcott	do	do	31 92
P. Nolan	From October 1 to December 3, 1866		31 46
J. Sterling	From December 3 to 31, 1866		17 96
William Cunningham	do	do	16 53
E. P. Faris	do	do	16 53
W. G. Brown	do	do	16 53
William Moran	do	do	16 53
E. Tucker	do	do	16 53
W. R. Smith	do	do	16 53
E. Giddings	do	do	16 53
N. N. Fuller	do	do	16 53
A. S. Ford	do	do	16 53
S. S. Strachan	do	do	16 53
S. Ten Eyck	From December 6 to 31, 1866		14 25
J. P. Hodnutt	From December 8 to 31, 1866		13 68
P. Ward	From December 11 to 31, 1866		12 54
W. H. Harding	do	do	11 97
C. Brown	From December 3 to 31, 1866		11 02
T. Slater	do	do	11 02
S. B. Owen	do	do	11 02
P. B. Prince	do	do	11 02
A. S. Pillsbury	do	do	11 02
C. E. T. Bailey	do	do	11 02
Thomas Martin	do	do	10 26
William Johnson	From November 1 to 30, 1866		9 97
A. Shoff	From December 11 to 31, 1866		8 55
William H. Smith	From December 17 to 31, 1866		43 70
E. G. Bowdoin	From October 1 to December 31, 1866		22 04
L. L. Crounse	From December 3 to 31, 1866		22 04
J. A. McKean	do	do	22 04
E. W. Barber	do	do	539 60
E. McPherson	From March 4, 1865, to September 30, 1866		171 00
C. Lloyd	From October 1 to December 31, 1866		102 60
J. M. Barclay	do	do	118 75
J. W. Clayton	do	do	85 50
Ferris Finch	do	do	85 50
J. R. Briggs, jr	do	do	85 50
Isaac Strohm	do	do	85 50

A.—Detailed statement of disbursements, &c.—Continued.

To whom paid	For what object.	Amount.	Total.
E. W. Barber.....	Additional pay per section 18 act of July 28, 1866:	.....	\$85 50
G. W. Matthews.....	From October 1 to December 31, 1866.....	.....	85 50
Paul Stevens.....	do.....do.....	.....	57 00
Paul Stevens.....	From July 1 to September 30, 1866.....	.....	54 34
J. Holcomb.....	From October 1 to December 31, 1866.....	.....	71 25
R. Bruce.....	From December 1 to 31, 1866.....	.....	19 00
G. A. Bassett.....	From October 1 to December 31, 1866.....	.....	102 60
J. B. Clerk, jr.....	do.....do.....	.....	57 00
R. J. Stevens.....	do.....do.....	.....	102 60
W. L. Woods.....	do.....do.....	.....	85 50
A. W. Boggs.....	do.....do.....	.....	42 75
Walter Burr.....	do.....do.....	.....	42 75
G. W. Johnes.....	do.....do.....	.....	85 50
J. Given.....	do.....do.....	.....	102 60
P. C. Given.....	From December 1 to 31, 1866.....	.....	22 80
W. H. McMonigal.....	From October 1 to December 31, 1866.....	.....	68 40
J. H. Hersey.....	do.....do.....	.....	68 40
B. F. Coolidge.....	do.....do.....	.....	68 40
William P. Anderson.....	From December 3 to 31, 1866.....	.....	16 53
A. J. Larnier.....	From October 1 to December 31, 1866.....	.....	85 50
V. Pulizzi.....	do.....do.....	.....	85 50
H. N. Carter.....	do.....do.....	.....	66 50
J. W. Nightingale.....	do.....do.....	.....	57 00
S. G. Bugh.....	do.....do.....	.....	57 00
P. H. Reinhard.....	From October 1 to November 30, 1866.....	.....	38 00
C. Stebbins.....	From December 1 to 31, 1866.....	.....	19 00
Joseph Reese.....	From October 1 to December 31, 1866.....	.....	57 00
William P. Copeland.....	From December 1 to 31, 1866.....	.....	17 67
Ira Goodnow.....	From October 1 to December 31, 1866.....	.....	102 60
O. S. Buxton.....	do.....do.....	.....	82 65
D. P. Brown.....	do.....do.....	.....	71 25
H. G. Russ.....	do.....do.....	.....	71 25
W. S. Saunders.....	do.....do.....	.....	71 25

H. H. Sperry	do	do	83 90
M. B. Brown	do	do	57 00
A. G. Bradstreet	do	do	57 00
J. Boyd	do	do	57 00
R. A. McPherson	do	do	57 00
L. P. Buckley	do	do	55 96
J. S. Samson	do	do	52 73
N. Joy	do	do	52 73
H. L. Bonsall	do	do	52 73
S. B. Wilson	do	do	52 73
J. S. Campbell	do	do	52 73
L. Harney	do	do	52 73
J. W. Simmons	From December 3 to 31, 1866	do	17 96
T. Miller	do	do	17 96
C. Johnson	do	do	17 96
Edwin Stevens	Clerk to Committee for the District of Columbia, from December 3 to 31, 1866	do	112 54

B.—Account of stationery furnished the Postmaster of the House of Representatives.

Stationery.	Price.	Amount.
104 $\frac{3}{4}$ reams letter paper per ream.	\$4 88	\$511 18
17 $\frac{1}{2}$.....do.....do.....	5 72	100 10
8.....do.....do.....	6 25	50 00
33 $\frac{1}{2}$.....do.....do.....	9 00	301 50
31 $\frac{1}{2}$.....do.....do.....	5 96	187 74
12.....do.....do.....	5 89	70 68
2.....do.....do.....	5 00	10 00
4 $\frac{1}{2}$.....do.....do.....	5 75	25 87 $\frac{1}{2}$
39.....do.....do.....	9 50	370 50
6.....do.....do.....	6 75	40 50
14.....do.....do.....	2 00	28 00
18 $\frac{1}{2}$.....do.....do.....	3 25	60 12 $\frac{1}{2}$
41 $\frac{1}{2}$.....do.....do.....	5 90	244 85
5 $\frac{1}{2}$.....do.....do.....	2 60	14 30
4.....do.....do.....	2 50	10 00
23 $\frac{1}{2}$.....do.....do.....	7 50	174 37 $\frac{1}{2}$
176 $\frac{1}{4}$ reams note paper.....do.....	3 44	606 30
94.....do.....do.....	2 95	277 30
30 $\frac{3}{4}$.....do.....do.....	2 49	76 57
2 $\frac{3}{4}$.....do.....do.....	1 35	3 71
$\frac{3}{4}$.....do.....do.....	2 25	1 69
$\frac{1}{4}$.....do.....do.....	1 44	36
27.....do.....do.....	2 97	80 19
$\frac{1}{2}$.....do.....do.....	3 96	1 98
5.....do.....do.....	6 57	32 85
5.....do.....do.....	3 75	18 75
2.....do.....do.....	1 50	3 00
1 $\frac{3}{4}$.....do.....do.....	6 77	11 85
$\frac{1}{2}$.....do.....do.....	2 60	1 30
5 $\frac{1}{2}$.....do.....do.....	4 00	22 00
44 $\frac{3}{4}$.....do.....do.....	4 12	184 37
6.....do.....do.....	6 75	40 50
6 $\frac{1}{2}$.....do.....do.....	2 90	18 85
7.....do.....do.....	2 38	16 66
10.....do.....do.....	3 57	35 70
39.....do.....do.....	3 05	118 95
20.....do.....do.....	5 00	100 00
$\frac{1}{2}$.....do.....do.....	3 02	1 51
$\frac{1}{2}$.....do.....do.....	4 85	2 42 $\frac{1}{2}$
$\frac{1}{2}$.....do.....do.....	1 60	80
107 $\frac{1}{2}$.....do.....do.....	6 00	642 00
58 $\frac{3}{4}$.....do.....do.....	3 21	188 59
4.....do.....do.....	4 50	18 00
1 $\frac{1}{2}$.....do.....do.....	2 50	3 75
1 $\frac{1}{2}$.....do.....do.....	1 70	2 55
1.....do.....do.....		5 10
1.....do.....do.....		6 54
1.....do.....do.....		3 91
1.....do.....do.....		1 37
13 reams Bath post paper per ream.	2 20	28 60
53 reams foolscap paper.....do.....	6 77	358 81
12.....do.....do.....	1 50	18 00
6.....do.....do.....	7 67	46 02
$\frac{1}{2}$.....do.....do.....	6 70	3 35
26 reams flat cap paper.....do.....	6 72	174 72
25.....do.....do.....	6 60	165 00
8.....do.....do.....	7 25	58 00
4.....do.....do.....	6 54	26 16
38 $\frac{1}{2}$ reams legal cap paper.....do.....	6 70	257 95
2.....do.....do.....	10 00	20 00
39 $\frac{1}{4}$.....do.....do.....	7 70	306 07 $\frac{1}{2}$
5.....do.....do.....	6 77	33 85

B.—Account of stationery, &c.—Continued.

Stationery.	Price.	Amount.
106 reams Manilla paper per ream.	\$0 37	\$39 22
31..... do..... do.....	49	15 19
536½..... do..... do.....	4 15	2,227 08
19..... do..... do.....	90	17 10
600..... do..... do.....	2 06	1,236 00
648½..... do..... do.....	4 50	2,918 25
207..... do..... do.....	7 95	1,645 65
688..... do..... do.....	2 25	1,548 00
110 packages blotting paper per package.	07	7 70
257..... do..... do.....	10	25 70
9..... do..... do.....	20	1 80
7½ quires blotting paper..... per ream.	16 00	6 00
5½..... do..... do.....	40 00	11 00
1 ream blotting paper.....		3 50
3 blotting pads..... each.....	1 87	5 61
6..... do..... do.....	65	3 90
6..... do..... do.....	1 75	10 50
3..... do..... do.....	2 28	6 84
850..... quills..... per 100..	2 40	20 40
50..... do..... do.....	2 50	1 25
2½ gross Swartwout's fasteners per gross.	2 75	6 56
1 gross paper fasteners.....		1 50
2 packages engrossing paper.....	5 00	10 00
2½ reams journal paper..... per ream.	20 00	50 00
502,000 envelopes per M..	3 90	1,957 80
9,100..... do..... do.....	12 00	109 20
436,000..... do..... do.....	3 61	1,573 96
956,000..... do..... do.....	3 03	2,896 68
14,050..... do..... do.....	10 50	147 52½
95,750..... do..... do.....	6 24	597 48
925..... do..... do.....	6 77	6 23
500..... do..... do.....	20 00	10 00
77,500..... do..... do.....	3 83	296 82½
5,900..... do..... do.....	3 91	22 97
9,350..... do..... do.....	10 45	97 24
22,750..... do..... do.....	14 00	318 50
3,000..... do..... do.....	9 00	27 00
2,000..... do..... do.....	6 00	12 00
200..... do..... do.....	5 50	1 10
192,700..... do..... do.....	2 85	549 19½
560,500..... do..... do.....	2 63	1,474 11½
5,100..... do..... do.....	5 00	25 50
17,125..... do..... do.....	3 25	55 65½
1,500..... do..... do.....	2 75	4 12½
134,000..... do..... do.....	3 15	422 10
33,650..... do..... do.....	7 00	235 55
45,450..... do..... do.....	6 40	290 88
5,500..... do..... do.....	12 96	71 28
121,800..... do..... do.....	4 18	509 12
108,650..... do..... do.....	4 88	530 21
3,000..... do..... do.....	4 00	12 00
41,950..... do..... do.....	8 00	335 60
11,675..... do..... do.....	7 90	92 23
1,875..... do..... do.....	7 50	14 62½
4,250..... do..... do.....	9 30	39 52½
3,250..... do..... do.....	11 50	37 37½
14,500..... do..... do.....	10 17	147 46½
5,500..... do..... do.....	4 95	27 22½
15,000..... do..... do.....	4 84	72 60
3,250..... do..... do.....	5 25	17 06
500..... do..... do.....	9 06	4 53
300..... do..... do.....	4 50	1 35
250..... do..... do.....	3 30	82½

B.—*Account of stationery, &c.*—Continued.

Stationery.	Price.	Amount.
250..... envelopes per M..	\$6 05	\$1 51
250..... do do	15 00	3 75
$\frac{1}{2}$ dozen Congress tie envelopes..... per dozen.	70	35
5 $\frac{1}{2}$ do do	60	3 30
2..... do do	50	1 00
5..... do do	40	2 00
2 $\frac{1}{2}$ do do	55	1 37 $\frac{1}{2}$
5..... do do	47	2 35
3 $\frac{1}{2}$ do do	65	2 27 $\frac{1}{2}$
5 $\frac{1}{2}$ do do	61	3 20
41..... boxes pens per box..	85	34 85
2..... do do	1 20	2 40
2..... do do	1 25	2 50
4..... do do	74	2 96
24..... do do	77	18 48
8..... do do	94	7 52
136..... do do	73	99 28
58..... do do	72	41 66
70..... do do	35	24 50
19..... do do	2 50	47 50
13..... do do	60	7 80
25..... do do	70	17 50
21..... do do	50	10 50
4..... do do	1 00	4 00
12..... do do	1 30	15 60
12..... do do	33 $\frac{1}{2}$	4 00
41..... do do	42	17 22
18..... do do	1 50	27 00
27..... do do	2 00	54 00
35..... do do	1 04	36 40
25..... do do	87 $\frac{1}{2}$	21 87 $\frac{1}{2}$
11..... do do	3 00	33 00
5..... do do	25	1 25
124..... do do	53	65 72
65..... do do	1 40	91 00
72..... do do	75	54 00
24..... do do	2 75	66 00
12..... do do	69	8 28
6..... do do	1 37	8 22
2..... do do	40	80
2..... gross pens per gross.	4 00	8 00
4..... do do	8 75	35 00
1..... box pens		88
1..... do		1 80
1..... do		62
1..... do		63
2..... gold pens each.	4 25	8 50
13..... do do	5 50	71 50
11..... do do	1 33	14 63
2..... do do	3 15	6 30
6..... do do	2 50	15 00
12..... do do	6 00	72 00
10..... do do	8 00	80 00
3..... do do	2 75	8 25
2..... do do	3 30	6 60
14..... do do	5 05	70 70
6..... do do	4 05	24 30
5..... do do	3 72	18 60
6..... do do	13 75	82 50
7..... do do	4 15	29 05
3..... do do	3 04	9 12
11..... do do	2 97	32 67
3..... do do	3 25	9 75

B.—Account of stationery, &c.—Continued.

Stationery.	Price.	Amount.
6..... gold pens..... each.....	\$4 91	\$29 46
6..... do..... do.....	2 92	17 52
6..... do..... do.....	3 57	21 42
6..... do..... do.....	8 47	50 82
6..... do..... do.....	13 31	79 86
2..... do..... do.....	20 00	40 00
6..... do..... do.....	4 00	24 00
6..... do..... do.....	3 50	21 00
1..... do..... do.....		3 78
12..... do..... per dozen.....		16 00
6 $\frac{1}{2}$ gross penholders..... per gross.....	2 00	11 83
5 $\frac{1}{2}$ do..... do.....	3 50	19 25
5..... do..... do.....	5 00	25 00
7 $\frac{1}{2}$ do..... do.....	5 50	42 62 $\frac{1}{2}$
2..... do..... do.....	9 00	18 00
2..... do..... do.....	4 00	8 00
3..... do..... do.....	4 50	13 50
1..... do..... do.....		2 25
125 dozen penholders..... per dozen.....	20	25 00
7..... do..... do.....	75	5 25
4..... do..... do.....	2 37	9 48
20..... do..... do.....	19	3 80
12..... do..... do.....	2 75	33 00
3 $\frac{1}{2}$ do..... do.....	3 00	10 00
3..... do..... do.....	2 12	6 36
2..... penholders..... each.....	21	42
7..... do..... do.....	23	1 61
27..... do..... do.....	1 50	40 50
26..... do..... do.....	15	3 90
13..... do..... do.....	13	1 69
6..... do..... do.....	37 $\frac{1}{2}$	2 25
3..... do..... do.....	80	2 40
14..... do..... do.....	33	4 62
24..... do..... do.....	85	20 40
12..... do..... do.....	24	2 88
34..... do..... do.....	38	12 92
2..... do..... do.....	25	50
2..... do..... do.....	18	36
9 gross lead pencils..... per gross.....	9 00	81 00
7 $\frac{1}{2}$ do..... do.....	9 44	67 65
6 $\frac{1}{2}$ do..... do.....	8 75	56 87 $\frac{1}{2}$
19 dozen color pencils..... per dozen.....	1 45	27 55
5 $\frac{1}{2}$ do..... do.....	3 00	15 50
8 $\frac{1}{2}$ do..... do.....	1 83	15 55 $\frac{1}{2}$
2..... do..... do.....	3 05	6 10
1 dozen artist's pencils.....		3 65
1 dozen lead pencils.....		50
$\frac{1}{2}$ do..... do.....	29	10
5 dozen propelling pencils..... per dozen.....	6 78	33 90
5..... do..... do.....	6 00	30 00
16 $\frac{1}{2}$ do..... do.....	5 43	87 78 $\frac{1}{2}$
2..... do..... do.....	3 30	6 60
1..... do..... do.....		5 00
1..... do..... do.....		4 70
12 propelling pencils..... each.....	1 61	19 32
12..... do..... do.....	1 47	17 64
2..... do..... do.....	40	80
1..... do..... do.....		1 80
24 gold mounted pencils..... each.....	1 74	41 76
15..... do..... do.....	2 00	30 00
12..... do..... do.....	1 58	18 96
6..... do..... do.....	1 55	9 30
4 gold pencils..... do.....	5 00	20 00

B.—Account of stationery, &c.—Continued.

Stationery.	Price.	Amount.
4 gold pencils.....each.....	\$4 06	\$16 24
6 silver pencils.....do.....	1 66	9 96
5 do.....do.....	1 80	9 00
6 letter stamps.....do.....	50	3 00
$1\frac{1}{2}$ dozen mucilage.....per dozen.....	3 50	2 92
$1\frac{1}{2}$ do.....do.....	1 80	1 50
$\frac{1}{6}$ do.....do.....	1 75	29
$6\frac{1}{2}$ do.....do.....	6 00	41 50
$13\frac{1}{2}$ do.....do.....	5 25	70 43 $\frac{1}{2}$
5 do.....do.....	2 50	12 50
3 do.....do.....	5 00	15 00
$1\frac{1}{2}$ do.....do.....	1 00	1 50
2 inkstands.....each.....	1 12	2 24
4 do.....do.....	87 $\frac{1}{2}$	3 50
3 do.....do.....	6 00	18 00
4 do.....do.....	2 45	9 80
2 do.....do.....	1 37	2 74
45 do.....do.....	28	12 60
9 do.....do.....	1 60	14 40
46 do.....do.....	27	12 40
8 do.....do.....	3 60	28 80
7 do.....do.....	2 35	16 45
22 do.....do.....	70	15 40
10 do.....do.....	2 50	25 00
6 do.....do.....	1 37 $\frac{1}{2}$	8 25
2 do.....do.....	3 25	6 50
6 do.....do.....	60	3 60
9 do.....do.....	1 19	10 71
$6\frac{1}{2}$ dozen inkstands.....per dozen.....	6 00	39 50
$\frac{1}{4}$ do.....do.....	24 00	6 00
1 do.....do.....		14 25
1 gross inkstands.....do.....		36 00
1 inkstand.....do.....		1 38
1 do.....do.....		1 57
1 do.....do.....		2 19
1 do.....do.....		2 17
1 do.....do.....		33
1 do.....do.....		2 58
1 do.....do.....		71
1 dozen bottles ink.....do.....		13 50
$\frac{1}{2}$ do.....per dozen.....	7 00	3 50
$3\frac{1}{6}$ do.....do.....	3 00	9 50
$8\frac{1}{2}$ do.....do.....	4 00	33 67
$\frac{7}{12}$ do.....do.....	9 25	5 40
2 do.....do.....	1 75	3 50
$3\frac{1}{4}$ do.....do.....	27 00	85 75
$2\frac{1}{4}$ do.....do.....	2 25	5 06
$11\frac{7}{12}$ do.....do.....	1 50	17 37 $\frac{1}{2}$
$5\frac{3}{4}$ do.....do.....	2 50	14 37 $\frac{1}{2}$
$\frac{1}{2}$ do.....do.....	3 88	1 94
$3\frac{1}{6}$ do.....do.....	1 95	6 17 $\frac{1}{2}$
$7\frac{3}{8}$ do.....do.....	6 17	47 30
2 do.....do.....	12 00	24 00
1 do.....do.....		3 57
1 do.....do.....		1 92
1 do.....do.....		3 60
3 bottles ink.....each.....	48	1 44
10 do.....do.....	35	3 50
16 do.....do.....	41	6 58
29 do.....do.....	30	8 70
2 do.....do.....	75	1 50
15 do.....do.....	94	14 10
4 do.....do.....	62 $\frac{1}{2}$	2 50

B.—Account of stationery, &c.—Continued.

Stationery.		Price.	Amount.
3.....	bottles ink each.....	\$0 58	\$1 74
1.....	do.....		62
1.....	do.....		50
1.....	do.....		45
1.....	do.....		15
1.....	do.....		52
2.....	knives each.....	7 10	14 20
6.....	do..... do.....	4 50	27 00
4.....	do..... do.....	8 00	32 00
4.....	do..... do.....	8 50	34 00
6.....	do..... do.....	6 84	41 04
4.....	do..... do.....	7 70	30 80
7.....	do..... do.....	2 46	17 22
4.....	do..... do.....	3 57	14 28
8.....	do..... do.....	1 24	9 92
6.....	do..... do.....	2 31	13 86
2.....	do..... do.....	2 66	5 32
115.....	do..... do.....	2 50	287 50
5.....	do..... do.....	2 16	10 80
6.....	do..... do.....	2 38	14 28
3.....	do..... do.....	2 58	7 74
9.....	do..... do.....	2 44	21 96
6.....	do..... do.....	3 50	21 00
6.....	do..... do.....	1 52	9 12
4.....	do..... do.....	4 25	17 00
12.....	do..... do.....	1 08	12 96
8.....	do..... do.....	1 87	14 96
19.....	do..... do.....	1 65	31 35
25.....	do..... do.....	2 83	70 75
8.....	do..... do.....	3 05	24 40
2.....	do..... do.....	3 27	6 54
19.....	do..... do.....	2 48	47 12
20.....	do..... do.....	1 88	37 60
5.....	do..... do.....	1 75	8 75
5.....	do..... do.....	1 96	9 80
17.....	do..... do.....	2 16	36 72
3.....	do..... do.....	2 56	7 68
6.....	do..... do.....	4 79	28 74
13.....	do..... do.....	2 96	38 48
11.....	do..... do.....	88	9 68
14.....	do..... do.....	3 46	48 44
7.....	do..... do.....	2 58	18 06
16.....	do..... do.....	3 50	56 00
4.....	do..... do.....	3 33	13 32
2.....	do..... do.....	2 04	4 08
6.....	do..... do.....	2 81	16 86
6.....	do..... do.....	2 87	17 22
6.....	do..... do.....	2 87½	17 25
9.....	do..... do.....	6 00	54 00
9.....	do..... do.....	3 33	29 97
2.....	do..... do.....	3 87	7 74
6.....	do..... do.....	3 40	20 40
6.....	do..... do.....	3 10	18 60
2.....	do..... do.....	5 75	11 50
6.....	do..... do.....	5 00	30 00
1.....	do.....		1 65
1.....	do.....		3 75
1.....	do.....		9 00
1.....	do.....		4 58
1.....	do.....		2 17
1.....	do.....		3 68
1.....	do.....		3 83
1.....	do.....		5 24

B.—Account of stationery, &c.—Continued.

Stationery.		Price.	Amount.
1.....	knives		\$3 87
1.....	do		1 81
1.....	do		2 60
1.....	do		1 93
1.....	do		5 73
1.....	do		2 75
1.....	do		2 83
1.....	do		7 70
1.....	do		8 10
1.....	do		9 10
1.....	dozen knives	per dozen. \$46 45	23 22 $\frac{1}{2}$
1.....	do	do 29 93	14 96 $\frac{1}{2}$
1.....	do	do 21 75	10 87 $\frac{1}{2}$
1.....	do	do 34 30	17 15
1.....	do	do 28 58	14 29
1.....	do	do 36 64	18 32
1.....	do	do 40 00	36 67
1.....	do	do 24 00	36 00
2.....	do	do 45 00	90 00
1.....	do	do 44 15	22 07 $\frac{1}{2}$
1.....	do	do 38 00	19 00
1.....	do	do 21 00	7 00
1.....	do	do 69 00	23 00
1.....	do	do 38 16	19 08
1.....	do	do 29 33	14 66 $\frac{1}{2}$
1.....	do	do 23 10	11 55
1.....	do	do 21 87	5 47
1.....	do	do 20 00	10 00
1.....	do	do 27 37	13 68 $\frac{1}{2}$
1.....	do		27 72
1.....	do		30 40
1.....	do		24 45
1.....	do		30 00
1.....	do		36 64
19.....	pairs shears	per pair 50	9 50
26.....	do	do 1 10	28 60
6.....	do	do 1 27	7 62
25.....	do	do 1 92	48 00
12.....	do	do 1 25	15 00
4.....	do	do 1 00	4 00
6.....	do	do 1 52	9 12
7.....	do	do 75	4 25
6.....	do	do 2 30	13 80
15.....	do	do 1 24	18 60
2.....	do	do 3 24	6 48
6.....	do	do 2 47	14 82
1.....	do		1 74
1.....	dozen pairs scissors		4 60
23.....	pairs scissors	per pair 38	8 74
13.....	do	do 83	10 79
17.....	do	do 82	13 94
23.....	do	do 60	13 80
14.....	do	do 80	11 20
4.....	sets scissors	per set 2 76	11 04
4.....	do	do 5 73	22 92
3.....	pocketbooks	each 3 75	11 25
8.....	do	do 4 00	32 00
4.....	do	do 3 25	13 00
6.....	do	do 2 75	16 50
3.....	do	do 4 25	12 75
19.....	do	do 2 50	47 50
3.....	do	do 1 21	3 63
3.....	do	do 1 80	5 40

B.—Account of stationery, &c.—Continued.

Stationery.		Price.	Amount.
4	pocketbooks.....each...	\$2 59	\$10 36
3	do.....do.....	1 38	4 14
4	do.....do.....	1 02	4 08
3	do.....do.....	1 04	3 24
3	do.....do.....	1 56	4 68
9	do.....do.....	1 26	11 34
5	do.....do.....	2 62	13 10
2	do.....do.....	1 50	3 00
8	do.....do.....	3 50	28 00
2	do.....do.....	2 40	4 80
6	do.....do.....	1 75	10 50
6	do.....do.....	1 58	9 48
6	do.....do.....	1 62	9 72
6	do.....do.....	2 18	13 08
6	do.....do.....	2 46	14 76
6	do.....do.....	2 58	15 48
2	do.....do.....	8 00	16 00
6	do.....do.....	1 96	11 76
5	do.....do.....	1 92	9 60
2	do.....do.....	2 60	5 10
1	do.....do.....		3 75
1	do.....do.....		1 37½
1	do.....do.....		25 00
1	do.....do.....		10 00
6	portfolios.....each...	14 25	85 50
2	do.....do.....	2 28	4 56
2	do.....do.....	1 87	3 74
4	do.....do.....	2 76	11 04
2	do.....do.....	5 33	10 66
3	do.....do.....	6 00	18 00
2	do.....do.....	5 50	11 00
2	do.....do.....	6 80	13 60
3	do.....do.....	1 92	5 76
6	do.....do.....	4 30	25 80
4	do.....do.....	4 25	17 00
2	do.....do.....	3 56	7 12
3	do.....do.....	5 92	17 76
2	do.....do.....	4 32	8 64
1	do.....do.....		8 50
1	do.....do.....		2 25
1	do.....do.....		11 25
1	do.....do.....		5 37
3	gross rubber bands.....per gross..	1 50	4 50
15	do.....do.....	1 48	22 20
7	do.....do.....	2 00	14 00
15	do.....do.....	2 25	33 75
4	do.....do.....	40	1 60
12	do.....do.....	12½	1 50
7	do.....do.....	1 75	12 25
2	do.....do.....	1 25	2 50
2½	do.....do.....	1 00	2 25
3	do.....do.....	80	2 40
2	do.....do.....	3 00	6 00
1	do.....do.....		2 75
1	do.....do.....		4 50
1	do.....do.....		3 25
2	dozen rubber bands.....per dozen.	08	16
2	do.....do.....	15	30
1	do.....do.....		17
1	do.....do.....		19
6	blank books.....each...	1 25	7 50
10	do.....do.....	75	7 50
8	do.....do.....	30	2 40

B.—Account of stationery, &c.—Continued.

Stationery.	Price.	Amount.
8.... blank books each...	\$0 56	\$4 48
16..... do do.....	50	8 00
5..... do do.....	62 $\frac{1}{2}$	3 12 $\frac{1}{2}$
3..... do do.....	2 50	7 50
3..... do do.....	4 50	13 50
2..... do do.....	69	1 38
16..... do do.....	1 00	16 00
6..... do do.....	1 86	11 16
6..... do do.....	1 98	11 88
5..... do do.....	2 80	14 00
12..... do do.....	31	3 72
6..... do do.....	33	1 98
6..... do do.....	1 26	7 56
6..... do do.....	84	5 04
18..... do do.....	89	16 02
12..... do do.....	39	4 68
2..... do do.....	2 20	4 40
5..... do do.....	1 37	6 85
9..... do do.....	1 76	15 84
6..... do do.....	28	1 68
6..... do do.....	22	1 32
12..... do do.....	42	5 04
6..... do do.....	37	2 22
6..... do do.....	1 26	7 56
1..... do do.....		1 60
1..... do do.....		73
1..... do do.....		5 40
1..... do do.....		1 50
1..... do do.....		3 00
1..... do do.....		4 50
1..... do do.....		2 20
1..... do do.....		21
1..... do do.....		3 00
14..... folders each...	75	10 50
6..... do do.....	1 12 $\frac{1}{2}$	6 75
3..... do do.....	1 29	3 87
3..... do do.....	1 03	3 09
24..... do do.....	80	19 20
12..... do do.....	1 31	15 72
5..... do do.....	1 42	7 10
12..... do do.....	66	7 92
12..... do do.....	99	11 88
19..... do do.....	1 37	26 03
12..... do do.....	56	6 72
14..... do do.....	50	7 00
3..... do do.....	38	1 14
2..... do do.....	96	1 92
1..... do do.....		1 30
2.. dozen folders per dozen.	9 00	18 00
1..... do do.....		15 55
1..... do do.....		7 50
52 spools pink tape per spool.	65	33 80
24..... do do.....	1 50	36 00
60..... do do.....	85	51 00
1 gross pink tape do.....		4 50
1..... do do.....		4 51
2 $\frac{1}{2}$ dozen silk taste per dozen.	3 50	7 87 $\frac{1}{2}$
16..... rulers each...	71	11 36
1..... do do.....		40
1..... do do.....		75
1..... dozen rulers do.....		6 50
1..... do do.....		7 50
1..... do do.....		5 75

B.—Account of stationery, &c.—Continued.

Stationery.	Price.	Amount.
1.....dozen rulers.....		\$6 00
6.....paper-weights.....each.....	\$1 70	10 20
6.....do.....do.....	60	3 60
8.....do.....do.....	70	5 60
6.....do.....do.....	1 92	11 52
6.....do.....do.....	25	1 50
6.....do.....do.....	1 49	8 94
3.....do.....do.....	1 62½	4 87½
2.....do.....do.....	1 62	3 24
3.....do.....do.....	1 35	4 05
3.....do.....do.....	1 81	5 43
6.....do.....do.....	60	3 60
1.....do.....do.....		1 63
1.....do.....do.....		74
1.....do.....do.....		2 50
1.....do.....do.....		1 50
1.....do.....do.....		2 25
7 dozen packs visiting cards.....per dozen.....	2 32	16 24
3½.....do.....do.....	2 06	8 07
8½.....do.....do.....	2 66	21 94
7½.....do.....do.....	2 53	18 97½
3.....do.....do.....	2 47	7 41
1.....do.....do.....		2 80
23.....pen-racks.....each.....	1 25	28 75
7.....do.....do.....	62½	4 37½
33.....do.....do.....	75	24 75
4.....do.....do.....	1 57	6 28
4.....do.....do.....	50	2 00
763 pounds twine.....per pound.....	55	419 65
1240½.....do.....do.....	30	372 15
20.....do.....do.....	1 10	22 00
521.....do.....do.....	44	229 24
940.....do.....do.....	87½	822 50
1063.....do.....do.....	45	478 35
511.....do.....do.....	67	342 37
568.....do.....do.....	60	336 00
604.....do.....do.....	62½	377 50
3.....scrap books.....each.....	2 75	8 25
2.....do.....do.....	1 50	3 00
4.....do.....do.....	1 00	4 00
2.....do.....do.....	1 05	2 10
2.....do.....do.....	87½	1 75
2.....do.....do.....	1 10	2 20
4.....do.....do.....	1 24	4 96
5.....do.....do.....	2 47	12 35
1.....do.....do.....		1 25
1.....do.....do.....		1 75
1.....do.....do.....		2 50
1.....do.....do.....		2 25
2 pounds stamping ink.....per pound.....	2 98	5 96
1 dozen bottles ink.....do.....		9 00
15 boxes wafers.....per box.....	15	2 25
1.....photograph album.....do.....		6 50
1.....do.....do.....		7 00
1.....do.....do.....		8 50
1 letter copying book.....do.....		2 75
3.....dozen pen-wipers.....per dozen.....	1 74	5 22
3.....do.....do.....	74	2 22
2 pen-wipers.....each.....	19	38
5 dozen pen-wipers.....per dozen.....	2 05	10 25
24.....autograph books.....each.....	3 00	72 00
2.....do.....do.....	1 20	2 40
45.....do.....do.....	2 13	95 85

B.—Account of stationery, &c.—Continued.

Stationery.	Price.	Amount.
4 autograph books.....each.....	\$1 35	\$5 40
14 do.....do.....	1 68	23 52
2 do.....do.....	1 73	3 46
19 boxes eyelets.....per box.....	35	6 65
23 paper boxes.....each.....	1 00	23 00
4 do.....do.....	1 25	5 00
8 do.....do.....	75	6 00
9 stationery boxes.....do.....	2 75	24 75
1 ruling pen.....		2 00
300 boxes writing sand.....per hundred.....	1 00	3 00
12 do.....per box.....	05	60
3½ dozen sand boxes.....per dozen.....	3 00	10 00
8 sand boxes.....	15	1 20
61½ pounds sealing wax.....per pound.....	1 98	122 26½
44 do.....do.....	1 75	77 00
5 do.....do.....	1 80	9 00
1 pamphlet cover.....		50
5 punches.....each.....	1 50	7 50
16 do.....do.....	71	11 36
12 do.....do.....	1 83	21 96
14 do.....do.....	80	11 20
1 do.....		1 00
1 dozen pencil sharpeners.....		52
2 do.....per dozen.....	55	1 10
3 pounds artists' gum.....per pound.....	1 10	3 30
5 do.....do.....	83	4 15
1 do.....do.....		1 75
15 pieces artists' gum.....per piece.....	06	90
13 do.....do.....	02	26
3 do.....do.....	09	27
6 do.....do.....	03	18
6 do.....do.....	10	60
6 letter clips.....each.....	1 00	6 00
5 do.....do.....	85	4 25
2 do.....do.....	52	1 04
6 do.....do.....	44	2 64
1 pair dividers.....		1 00
9 sponge cups.....each.....	37½	3 37½
6 do.....do.....	62½	3 75
163 pieces sponge.....per piece.....	08	13 04
4 adhesive files.....each.....	1 25	5 00
6 diaries.....do.....	1 00	6 00
12 do.....do.....	1 25	15 00
12 do.....do.....	2 50	30 00
6 do.....do.....	2 00	12 00
9 do.....do.....	2 25	20 25
6 do.....do.....	1 37	8 22
4 do.....do.....	1 64	6 56
5 do.....do.....	1 83	9 15
2 do.....do.....	1 54	3 08
19 erasing knives.....do.....	50	9 50
27 do.....do.....	62½	16 87½
32 do.....do.....	27	8 64
19 do.....do.....	33	6 27
2 boxes tickets.....do.....	15	30
17 newspaper files.....do.....	50	8 50
1 dozen ready reference files.....		2 21
1 do.....		1 85
1 do.....		2 00
24 ready reference files.....each.....	19	4 56
12 do.....do.....	15	1 80
24 do.....do.....	16	3 84
24 do.....do.....	17	4 08

C.—Account of stationery furnished the Clerk's office.

Stationery.	Price.	Amount.
2½ reams letter paper per ream.	\$6 75	\$16 87½
2.....do.....do.....	2 00	4 00
7.....do.....do.....	5 90	41 30
3.....do.....do.....	5 96	17 88
12½.....do.....do.....	4 88	59 78
1½.....do.....do.....	5 72	8 58
½.....do.....do.....	2 20	1 10
½.....do.....do.....	9 50	4 75
½.....do.....do.....	5 66	2 83
½.....do.....do.....	5 89	2 94½
1.....do.....do.....		5 60
10.....do.....do..... per ream.	9 75	97 50
6 packages engrossing paper..... per package.	5 00	30 00
3 reams journal paper..... per ream.	20 00	60 00
2½ reams legal cap paper.....do.....	6 70	16 75
1½.....do.....do.....	7 70	11 55
8½ reams foolscap paper.....do.....	6 77	54 16
½.....do.....do.....	7 67	3 83½
4.....do.....do.....	1 50	6 00
1 ream flat cap paper.....do.....		6 54
18 reams note paper.....do..... per ream.	2 95	53 10
½.....do.....do.....	1 37	68½
6½.....do.....do.....	2 49	16 18½
1½.....do.....do.....	1 35	1 69
6.....do.....do.....	3 44	20 64
4½.....do.....do.....	3 21	14 44½
3½.....do.....do.....	6 00	21 00
3½.....do.....do.....	75	2 62½
1½.....do.....do.....	7 62	11 43
10.....do.....do.....	7 75	77 50
2.....do.....do.....	2 97	5 94
2½.....do.....do.....	4 00	9 00
5½.....do.....do.....	4 12	21 63
2½.....do.....do.....	2 38	5 95
½.....do.....do.....	7 75	3 87½
¼.....do.....do.....	3 12	78
¼.....do.....do.....	2 60	65
¼.....do.....do.....	3 02	75½
¼.....do.....do.....	5 01	1 25
¼.....do.....do.....	4 85	1 21
¼.....do.....do.....	4 00	1 00
1.....do.....do.....		1 70
1.....do.....do.....		2 90
17 reams Manilla paper.....do..... per ream.	37	6 29
4.....do.....do.....	90	3 60
8.....do.....do.....	49	3 92
2,250... envelopes.....do..... per thousand.	4 88	10 98
11,775.....do.....do.....	4 18	49 22
500.....do.....do.....	3 91	1 95½
1,000.....do.....do.....	12 96	12 96
3,800.....do.....do.....	7 00	26 60
4,350.....do.....do.....	3 25	14 14
1,500.....do.....do.....	8 00	12 00
250.....do.....do.....	2 75	69
600.....do.....do.....	4 00	2 40
850.....do.....do.....	6 40	5 44
500.....do.....do.....	7 62	3 81
750.....do.....do.....	5 25	3 94
3,500.....do.....do.....	6 24	21 18
750.....do.....do.....	10 50	7 87½
175.....do.....do.....	4 90	86
200.....do.....do.....	3 50	70
125.....do.....do.....	3 20	40

C.—*Account of stationery, &c.*—Continued.

Stationery.	Price.	Amount.
150..... envelopes..... per thousand.	\$5 00	\$0 75
750..... do..... do.....	4 95	3 71
1,000..... do.....		9 00
1,000..... do.....		7 90
1,000..... do.....		3 15
1,000..... do.....		12 00
1,000..... do.....		10 45
1,000..... do.....		10 17
1½ dozen congressional tie envelopes..... per dozen.	60	90
$\frac{1}{6}$ do..... do..... do.....	50	08
$\frac{1}{6}$ do..... do..... do.....	47	08
1..... do..... do.....		65
2..... boxes pens..... per box..	3 00	6 00
3..... do..... do.....	60	1 80
6..... do..... do.....	1 40	8 40
2..... do..... do.....	2 50	5 00
10..... do..... do.....	85	8 50
10..... do..... do.....	73	7 30
12..... do..... do.....	75	9 00
3..... do..... do.....	1 00	3 00
7..... do..... do.....	2 00	14 00
5..... do..... do.....	35	1 75
2..... do..... do.....	1 30	2 60
3..... do..... do.....	1 04	3 12
4..... do..... do.....	42	1 68
4..... do..... do.....	83	3 32
12..... do..... do.....	53	6 36
6..... do..... do.....	1 40	8 40
2..... do..... do.....	94	1 88
4..... do..... do.....	72	2 88
1..... do.....		88
1..... do.....		70
1..... do.....		1 70
3..... gold pens..... each.....	4 00	12 00
3..... do..... do.....	3 15	9 45
4..... do..... do.....	3 04	12 16
2..... do..... do.....	5 50	11 00
2..... do..... do.....	3 72	7 44
2..... do..... do.....	2 25	6 50
3..... do..... do.....	5 05	15 15
1..... do.....		8 00
1..... do.....		2 75
1..... do.....		2 97
1..... do.....		4 75
1..... do.....		5 02
1..... do.....		4 25
1..... do.....		4 15
1..... do.....		1 33
1..... do.....		3 78
1..... do.....		3 00
7..... bottles mucilage..... each.....	50	3 50
2..... do..... do.....	21	42
1..... do.....		29
1..... do.....		42
3½ dozen mucilage..... per dozen.	5 25	16 19
8..... erasing knives..... each.....	62½	5 00
5..... do..... do.....	27	1 35
5..... do..... do.....	33	1 65
1..... do.....		50
12 boxes visiting cards..... per box..	17	2 04
8..... do..... do.....	22	1 76
21..... do..... do.....	19	3 99
4..... do..... do.....	23	92

C.—Account of stationery, &c.—Continued.

Stationery.	Price.	Amount.
21 boxes visiting cards.....per box..	\$0 21	\$4 41
7 $\frac{1}{2}$ gross lead pencils.....per gross..	9 00	65 25
1 $\frac{1}{2}$.....do.....do.....	8 75	13 12 $\frac{1}{2}$
1 dozen lead pencils.....		79
3 $\frac{1}{2}$ dozen color pencils.....per dozen..	1 45	5 07 $\frac{1}{2}$
2 $\frac{1}{2}$.....do.....do.....	1 83	4 27
1.....do.....		1 85
2 color pencils.....each.....	10	20
24....rubber pencils.....do.....	45	10 80
2.....do.....do.....	44	88
6.....do.....do.....	57	3 42
4.....ivory pencils.....do.....	40	1 60
1.....do.....		50
1.....do.....		1 61
7 gold-mounted pencils.....each.....	2 00	14 00
2.....do.....do.....	1 58	3 16
4.....do.....do.....	1 74	6 96
1.....gold pencil.....		5 00
1.....do.....		4 06
2 pounds sealing wax.....per pound..	1 98	3 96
7.....do.....do.....	1 75	12 25
5.....knives.....each.....	2 83	14 15
2.....do.....do.....	2 04	4 08
2.....do.....do.....	2 16	4 32
8.....do.....do.....	2 46	19 68
2.....do.....do.....	4 79	5 58
6.....do.....do.....	3 33	19 98
5.....do.....do.....	2 50	12 50
5.....do.....do.....	2 81	14 05
2.....do.....do.....	3 50	7 00
1.....do.....		1 87
1.....do.....		3 05
1.....do.....		1 65
1.....do.....		1 93
1.....do.....		2 37
1.....do.....		1 24
1.....do.....		9 10
1.....do.....		1 66
1.....do.....		2 58
1.....do.....		88
1.....do.....		3 18
1.....do.....		4 58
1.....do.....		3 04
1.....do.....		3 60
4.....do.....each.....	6 00	24 00
2.....do.....do.....	4 25	8 50
2.....do.....do.....	8 50	17 00
3.....do.....do.....	8 00	24 00
2.....do.....do.....	3 75	7 50
6.....do.....do.....	2 96	17 76
2.....do.....do.....	1 81	3 82
7.....do.....do.....	2 44	17 08
2.....do.....do.....	2 32	4 64
2.....do.....do.....	3 87	7 74
2.....folders.....do.....	1 30	2 60
6.....do.....do.....	56	3 36
4.....do.....do.....	1 37	5 48
4.....do.....do.....	75	3 00
2.....do.....do.....	1 31	2 62
2.....do.....do.....	80	1 60
3.....do.....do.....	1 42	4 26
1.....do.....		1 03
.....do.....		96

C.—*Account of stationery, &c.*—Continued.

Stationery.	Price.	Amount.
1..... folder		\$0 25
1..... do		92
1..... do		20
1..... portfolio		4 32
1..... do		8 50
1..... do		5 33
1..... do		2 47
1..... do		5 44
1..... do		5 54
1..... do		4 30
2..... do..... each.....	\$14 25	28 50
2..... do..... do.....	11 25	22 50
6..... eyelet punches	1 10	6 60
2..... do..... do.....	1 83	3 66
4..... inkstands	3 60	14 40
8..... do..... do.....	1 19	9 52
6..... do..... do.....	2 35	14 10
2..... do..... do.....	28	56
2..... do..... do.....	3 25	6 50
2..... do..... do.....	1 25	2 50
2..... do..... do.....	70	1 40
1..... do..... do.....		71
1..... do..... do.....		78
1..... do..... do.....		2 50
1..... do..... do.....		1 60
1..... do..... do.....		2 45
1..... do..... do.....		1 75
1..... do..... do.....		4 00
1..... do..... do.....		1 15
1..... do..... do.....		87½
3..... bottles ink..... each.....	50	1 50
4..... do..... do.....	51	2 04
17..... do..... do.....	17	2 89
27..... do..... do.....	94	25 38
4..... do..... do.....	1 12½	4 50
4..... do..... do.....	30	1 20
1..... do..... do.....		75
1..... do..... do.....		41
1..... do..... do.....		16
1..... do..... do.....		53
2..... do..... each.....	21	42
1½ dozen bottles ink..... per dozen.....	1 50	2 00
6..... paper-weights..... each.....	1 49	8 94
3..... do..... do.....	1 63	4 89
2..... do..... do.....	1 50	3 00
3..... do..... do.....	1 35	4 05
2..... do..... do.....	1 92	3 84
1..... do..... do.....		2 25
1..... do..... do.....		60
1..... do..... do.....		1 81
1..... do..... do.....		1 70
3..... pen-wipers..... each.....	80	2 40
1..... do..... do.....		74
1..... do..... do.....		19
2..... diaries..... each.....	2 00	4 00
3..... do..... do.....	1 06	3 18
1..... do..... do.....		1 83
2 pieces artists' gum..... each.....	06	12
12..... do..... do.....	07	84
2..... do..... do.....	09	18
2½ quires blotting paper..... per ream.....	16 00	2 00
¾..... do..... do.....	40 00	1 50
6 packages blotting paper..... per package.....	20	1 20

C.—Account of stationery, &c.—Continued.

Stationery.	Price.	Amount.
13 packages blotting paper..... per package.	\$0 07½	\$0 97½
27..... do..... do.....	10	2 70
1½ dozen penholders..... per dozen.	29	36
1½..... do..... do.....	75	1 12½
2½..... do..... do.....	42	1 15½
¾..... do..... do.....	44	33
¼..... do..... do.....	46	11½
3..... do..... do.....	3 00	9 00
2..... do..... do.....	2 75	5 50
1..... do..... do.....		2 37
1..... do..... do.....		13
1..... do..... do.....		17
3..... penholders..... each.....	15	45
28..... do..... do.....	23	6 44
3..... do..... do.....	21	63
5..... do..... do.....	20	1 00
3..... do..... do.....	24	72
4..... do..... do.....	80	3 20
7..... do..... do.....	29	2 03
6..... do..... do.....	38	2 28
3..... do..... do.....	1 44	4 32
6..... do..... do.....	42	2 52
1..... do..... do.....		1 50
½ dozen paper fasteners..... per gross.	2 75	46
2 sand boxes..... each.....	25	50
3..... blank books..... do.....	52	1 56
8..... do..... do.....	1 00	8 00
2..... do..... do.....	50	1 00
2..... do..... do.....	30	60
3..... do..... do.....	2 20	6 60
2..... do..... do.....	33	66
2..... do..... do.....	1 76	3 52
2..... do..... do.....	37	74
1..... do..... do.....		1 37
1..... do..... do.....		57
1..... do..... do.....		84
1..... do..... do.....		5 40
1..... do..... do.....		1 76
1..... do..... do.....		89
2..... do..... each.....	1 50	3 00
2..... scrap-books..... do.....	1 05	2 10
3..... do..... do.....	1 10	3 30
2..... do..... do.....	1 00	2 00
2..... do..... do.....	2 47	4 94
2..... do..... do.....	1 24	2 48
1..... do..... do.....		1 25
1..... do..... do.....		1 50
4..... pen-racks..... each.....	75	3 00
3..... do..... do.....	1 00	3 00
1..... do..... do.....		25
1..... do..... do.....		1 57
16..... spools tape..... per spool.	65	10 40
14..... do..... do.....	85	11 90
8..... boxes cut quills..... each.....	50	4 00
3..... do..... do.....	53	1 59
4 boxes eyelets..... do.....	35	1 40
1 autograph book..... do.....		1 73
2½ dozen silk taste..... per dozen.	3 50	8 75
6 gross pink tape..... per gross.	4 51	27 06
2 newspaper files..... each.....	50	1 00
2 ready-reference file..... do.....		19
6 boxes writing sand..... per box..	05	30
1 photograph album..... do.....		15 00

C.—*Account of stationery, &c.*—Continued.

Stationery.	Price.	Amount.
1 photograph album.....		\$9 00
8..... rulers..... each.....	\$0 71	5 68
2..... do..... do.....	75	1 50
1..... do.....		89
1..... do.....		40
1..... do.....		30
6..... pairs scissors..... each.....	50	3 00
3..... do..... do.....	82	2 45
2..... do..... do.....	80	1 60
4..... do..... do.....	60	2 40
2..... cases scissors..... do.....	5 73	11 46
3..... do..... do.....	3 24	9 72
1 pair scissors.....		38
2..... pairs shears..... each.....	1 24	2 48
4..... do..... do.....	1 92	7 68
2..... do..... do.....	1 27	2 54
4..... do..... do.....	2 30	9 20
1..... do.....		1 74
1..... do.....		1 47
1..... do.....		75
1..... do.....		1 10
1..... sponge cup.....		21
1..... do.....		37½
3 pieces sponge..... each.....	08	24
444 sheets parchment..... do.....	40	177 60
2..... portemonnaies..... do.....	1 21	2 42
2..... do..... do.....	1 80	3 60
2..... do..... do.....	2 00	4 00
2..... do..... do.....	1 08	2 16
3..... do..... do.....	1 38	4 14
3..... do..... do.....	2 58	7 74
1..... do.....		1 26
1..... do.....		2 50
1..... do.....		3 37
1..... do.....		2 62
1..... do.....		2 59
3 dozen rubber bands..... per dozen.....	33	99
4..... do..... do.....	19	76
1½..... do..... do.....	15	22½
1..... do.....		17
1..... do.....		08
2 gross rubber bands..... per gross.....	1 00	2 00
3½..... do..... do.....	2 25	7 87½
1..... do.....		1 48

D.

Balance of unexpended appropriations in the treasury \$101,288 37

GEOLOGICAL SURVEY IN DAKOTA.

MEMORIAL

FROM

THE LEGISLATURE OF DAKOTA

RELATIVE TO

A geological survey of the Territory.

JANUARY 19, 1867.—Referred to the Committee on Appropriations, and ordered to be printed.

MEMORIAL to Congress relative to a Geological Survey of the Black Hills country.

*To the honorable the Senate and House of Representatives of the United States
in Congress assembled.*

Your memorialists, the legislative assembly of the Territory of Dakota, most respectfully beg leave to again petition your honorable bodies to grant a sufficient appropriation of money to institute and carry out a complete and thorough geological survey of the Black Hills country, in Dakota Territory; and your memorialists are led to thus again call your attention to this matter for the following reasons:

By an Act of Congress, approved March 3, 1865, the sum of \$20,000 was appropriated for the purpose of opening and establishing a government wagon road up the Great Cheyenne Valley, and through the Black Hills, to connect with the Virginia City road near Powder river; and whereas the commissioner appointed to open said road was unable to prosecute his labors in the field beyond the forks of the Cheyenne river, on account of the hostile attitude of the Indians in the Black Hills, in the summer of 1865; and whereas, by request of the northwestern Indian commissioners in 1866, the further work on said road was suspended until treaties could be consummated with the Indian tribes along said line; and whereas the proposed treaties have now been made by which the said tribes cede the right of way through their country to the mountains, but still dispute with the United States the right of possession to the Black Hills; which are known to be rich in gold, silver, iron, coal and pine forests, thereby shutting out to immigration and settlement one of the finest agricultural and mineral regions of our Territory; and whereas the preliminary explorations of Lieutenant Warren and Dr. Hayden in that region furnish conclusive evidence of the existence of gold and the precious metals in the Black Hills, within one hundred and thirty miles of the steamboat navigation of the Missouri river; and whereas it is believed that coal and iron will be found in vast quantities at the eastern base of said Hills, on the head-waters of the Cheyenne river, whenever a thorough exploration shall be permitted by the Indians or enforced by the

government; and whereas it is the opinion of your memorialists that the government would reap a fourfold reward in return for an appropriation to complete an early and thorough exploration of said Hills, under protection of an ample military escort; and whereas there yet remains of the \$20,000 appropriated for the opening of the Cheyenne road the sum of \$14,000, unexpended balance yet to be applied to the opening of said road through the disputed mineral fields of the Black Hills; and whereas Dr. J. V. Hayden, of the Smithsonian Institute, has devoted several years to scientific research in that region, and is a hearty co-operator and zealous advocate of the material interests and natural resources of the northwest; therefore, your memorialists would most respectfully pray that a sufficient appropriation be made by your honorable body in addition to the unexpended balance of the Cheyenne wagon road appropriation, to enable a thorough scientific exploration to be made by Dr. Hayden, during the present season, in connection with the opening of said road, under sufficient military force, to take undisputed possession of the Black Hills, and establish a permanent military post therein.

And your memorialists as in duty bound will ever pray.

J. B. S. TODD, *Speaker.*

T. WIXSON, *Chief Clerk.*

M. K. ARMSTRONG,
President of Council.

B. M. SMITH, *Secretary of Council.*

Approved, Yankton, Dakota Territory, January 9, 1867.

A. J. TAURK, *Governor.*

REPEALING ACT OF CONGRESS.

MEMORIAL

OF THE

LEGISLATIVE ASSEMBLY OF THE TERRITORY OF ARIZONA.

ASKING

That the act of Congress, approved May 5, A. D. 1866, setting off to the State of Nevada all that part of the Territory of Arizona west of the 37th degree of longitude west from Washington, and west of the Colorado river, be repealed.

JANUARY 21, 1867.—Ordered to be printed, and referred to the Committee on the Territories.

MEMORIAL asking that the act of Congress, approved May 5, A. D. 1866, setting off to the State of Nevada all that part of the Territory of Arizona west of the 37th degree of longitude west from Washington, and west of the Colorado river, be repealed.

To the Senate and House of Representatives of the United States in Congress assembled :

Your memorialists, the legislative assembly of the Territory of Arizona, respectfully represent that by an act approved May 5, 1866, Congress added to and made a part of the State of Nevada "all that extent of territory lying within the following boundaries, to wit: Commencing on the thirty-seventh degree of north latitude, at the thirty-seventh degree of longitude west from Washington, and running thence south on said degree of longitude to the middle of the river Colorado of the West; thence down the middle of said river to the eastern boundary of California; thence northwesterly along said boundary of California to the thirty-seventh degree of north latitude, and east along said degree of latitude to the point of beginning;" provided, however, that the territory mentioned should not become a part of the State of Nevada until said State should, through its legislature, consent thereto.

Your memorialists further represent that, to the best of their knowledge and belief, this territory has not yet been accepted by the State of Nevada, in the terms and manner required by the foregoing provision, and that the matter is yet wholly within the control of Congress, and they earnestly pray that the act by which it is proposed to take from Arizona this important part of her territory be repealed by your honorable bodies.

The area in question, which embraces the chief part of Pah-Ute county, and all of Mohave county west of the Colorado river, holds a natural and convenient relation to the Territory of Arizona, and a most unnatural and inconvenient one to the State of Nevada. It is the water-shed of the Colorado river, into which all the principal streams of Arizona empty, and which has been justly styled the Mississippi of the Pacific. By this great river the Territory receives the most of its supplies, and lately it has become the channel of a large part of the

trade of San Francisco with Utah and Montana. Moreover, while it is a comparatively short and easy journey from any part of the Territory in question to the county seats or the capital of Arizona, it is a tedious and perilous one of three hundred miles to the nearest county seat in Nevada; and to reach the capital of that State, by reason of intervening deserts, including the celebrated "Death Valley," over which travel is often impossible and always extremely hazardous, it is necessary to go around by Los Angeles and San Francisco, a distance of some fifteen hundred miles, and a most circuitous way. It is the unanimous wish of the inhabitants of Pah-Ute and Mohave counties, and, indeed, of all the constituents of your memorialists, that the territory in question should remain within Arizona; for the convenient transaction of official and other business, and on every account, they greatly desire it. And on their behalf, and in accordance with what appears to be no more than a matter of simple justice and reason, your memorialists earnestly request your honorable bodies to set aside the action by which it is proposed to cede it to Nevada; and, as in duty bound, your petitioners will ever pray.

Resolved, That our delegate in Congress, Hon. John N. Goodwin, is hereby requested to spare no effort to secure a favorable response to this memorial.

GRANVILLE H. OURY,

Speaker of the House of Representatives.

MARK AIDRICH,

President of the Council.

Approved November 5, 1866.

RICHARD C. McCORMICK.

A true copy of the original on file in my office.

[SEAL.]

HENRY W. FLEURY,

Assistant Secretary of the Territory.

TOWN OF PRESCOTT.

MEMORIAL

OF THE

LEGISLATIVE ASSEMBLY OF THE TERRITORY OF ARIZONA,

ASKING

Congress to donate two quarter sections of land to the town of Prescott.

JANUARY 21, 1867.—Ordered to be printed and referred to the Committee on the Public Lands.

To the Senate and House of Representatives of the United States in Congress assembled:

Your memorialists, the legislative assembly of the Territory of Arizona, most respectfully represent, that whereas, early in the summer of eighteen hundred and sixty-four, the governor of this Territory caused to be established the temporary seat of government at what is now known as the town of Prescott, which was duly surveyed, platted, and laid off into suitable and convenient sized lots for building, and many of said lots have been and are now used for business purposes;

And whereas said town is conveniently situated as a business centre for a large portion of our surrounding country, and must, from its situation, become a town of much importance;

And whereas the present precarious and unsatisfactory titles to said lots (which are only possessory in their character) greatly retards the progress and prosperity of said town:

Therefore your memorialists most earnestly and respectfully pray that you will set apart three hundred and twenty acres of land, embracing said town site, as a donation, under the same provisions and in accordance with "an act providing for the relief of the citizens of Denver, in the Territory of Colorado," approved the twenty-eighth day of May, A. D. 1864: Therefore,

Be it resolved by the legislative assembly of the Territory of Arizona, That our delegate in Congress, the Hon. John N. Goodwin, be, and he is hereby, requested to use all honorable means to secure the attention of Congress to the above subject.

And be it further resolved, That the governor of this Territory be requested to transmit a copy of the foregoing memorial to our delegate in Congress.

GRANVILLE H. OURY,

Speaker of the House of Representatives.

MARK ALDRICH,

President of the Council.

Approved November 6, 1866.

RICHARD C. McCORMICK.

A true copy of the original on file in my office. Witness my hand and the seal of the Territory. Given at Prescott, this eighth day of November, A. D. 1866.

[SEAL.]

J. P. T. CARTER,
Secretary of the Territory.

MAIL ROUTES.

MEMORIAL

OF THE

LEGISLATIVE ASSEMBLY OF THE TERRITORY OF ARIZONA,

ASKING FOR

The establishment of new mail routes.

JANUARY 21, 1867.—Ordered to be printed, and referred to the Committee on Post Offices and Post Roads.

MEMORIAL asking for the establishment of new mail routes.

To the Senate and House of Representatives of the United States in Congress assembled :

Your memorialists, the legislative assembly of the Territory of Arizona, respectfully represent that, in accordance with a concurrent resolution of which the following is a copy,

“Resolved by the house of representatives, (the council concurring,) That a committee of three from the house and two from the council be appointed as a special committee to inquire into, examine witnesses, and take evidence under oath, if necessary, as to the necessity and practicability of memorializing Congress as to establishing other mail routes, and putting service on those already established; and especially with reference to procuring service from San Bernardino, California, to Wickenburg, via La Paz, connecting with that already established from Tubac and Tucson to Prescott; also from La Paz to Arizona City, in continuation of that from Mohave to La Paz”—

A committee was appointed, who have examined witnesses and received evidence regarding the necessity and practicability of additional mail service in the Territory. Said committee report that a large and growing commercial population on the Colorado river demands that postal service, for the accommodation of the various towns upon the river, as well as for the convenience of the interior country, be at once established upon the route (created by act of Congress, June 30, 1864,) from Los Angeles, via La Paz, to Wickenburg, connecting at the latter place with the route from Tubac and Tucson to Prescott, now in operation. This service will prove highly advantageous to the southern and western parts of the Territory. It is also important for the interests of a considerable and increasing mining population that Congress should immediately declare a postal route from Prescott to Lynx Creek, Big Bug, Woolsey's Ranch, and Turkey Creek, and put service thereon.

Service is also needed on the established routes from La Paz, via Eureka, to Arizona City, and from Prescott, via Fort Wingate, to Albuquerque, on the Rio

Grande, and from Fort Yuma, via Tucson, to Mesilla. It is also recommended that the route from Wickenburg to Prescott be so changed as to run by Walnut Grove, and that a route be established from Callville to Pahranaagat.

For any further information than that now in possession of Congress and the Post Office Department, regarding these several routes, reference is respectfully made to Gird's official map of the Territory of Arizona.

Resolved, That to promote the object of this memorial the secretary of the Territory is herewith requested to transmit a copy of the same to our delegate in Congress, honorable John N. Goodwin, and also a copy to the Postmaster General.

GRANVILLE H. OURY,
Speaker of the House of Representatives.
MARK ALDRICH,
President of the Council.

Approved November 5, 1866.

RICHARD C. McCORMICK.

A true copy of the original on file in my office. Witness my hand and the
[SEAL.] seal of my office. Given at Prescott this tenth day of November, A. D. .
1866.

HENRY W. FLEURY,
Assistant Secretary of the Territory.

SOUTHERN PACIFIC RAILROAD.

MEMORIAL

OF THE

LEGISLATIVE ASSEMBLY OF THE TERRITORY OF ARIZONA,

ASKING FOR

Aid to the Southern Pacific railroad.

JANUARY 21, 1867.—Ordered to be printed and referred to the Committee on the Pacific Railroad.

MEMORIAL concerning the Southern Pacific railroad.

*To the honorable the Senate and House of Representatives of the United States
in Congress assembled :*

Your memorialists, the legislative assembly of the Territory of Arizona, consisting of the council and house of representatives, in session at Prescott, respectfully represent that the people of this Territory are now almost isolated from the outside world, being far removed from the thoroughfares of commerce and civilization which are open to the citizens of almost every other portion of the domain of the United States, while unbounded mineral and agricultural sources of wealth lie undeveloped, solely for want of facilities for communication with the commerce of the rest of the world.

That we have learned that a bill will be introduced before your honorable bodies for a charter for the construction of a railroad from the most available point on the Colorado river, to run through the central portion of this Territory, by or near the capital, and to connect with the Southern Pacific railroad on the eastern boundary of the Territory, which if passed will inure to the greatest benefit to the people of Arizona, and greatly facilitate the development the settlement of the Territory.

Therefore we respectfully solicit of your honorable bodies the passage of an act to appropriate such an amount of the public lands in aid of the construction of such contemplated railroad as will be adequate to secure its most speedy completion, being assured, as we are, that it will result in such an increase of wealth in the shape of taxable property as will in a very short period amply remunerate the United States government for such donation; and, as in duty bound, your memorialists will ever pray.

Resolved, That our delegate in Congress, the Hon. John N. Goodwin, is here-

by requested to use all honorable means in his power to secure the passage of such act, and that his excellency the governor of the Territory of Arizona be requested to transmit a copy of this memorial to our delegate in Congress.

GRANVILLE H. OURY,

Speaker of the House of Representatives.

MARK ALDRICH,

President of the Council.

Approved November 6, 1866.

RICHARD C. McCORMICK.

A true copy of the original on file in my office. Witness my hand and the seal of my office. Given at Prescott, this 10th day of November, A. D. 1866.

[SEAL.]

HENRY W. FLEURY,

Assistant Secretary of the Territory.

ORGANIC LAW OF THE TERRITORY.

MEMORIAL

OF THE

LEGISLATIVE ASSEMBLY OF THE TERRITORY OF ARIZONA,

ASKING FOR

A change in the organic law of the Territory.

JANUARY 21, 1867.—Ordered to be printed and referred to the Committee on the Territories.

MEMORIAL asking Congress so to change the organic act of New Mexico (extended over this Territory) as to increase the jurisdiction of justices of the peace to three hundred dollars.

To the Senate and House of Representatives of the United States in Congress assembled:

Your memorialists, the legislative assembly of the Territory of Arizona, respectfully represent, that whereas, by the organic act of New Mexico, extended over this Territory, the jurisdiction of justices of the peace is limited to one hundred (\$100) dollars; and whereas the next court of original jurisdiction is the district court; and whereas, there being but three districts within the Territory, the terms are necessarily held at long intervals and at such points as to compel some of our people to travel long distances, entailing great expense; and whereas, in consequence of these grievances, justice is often delayed and sometimes wholly defeated:

Therefore, to secure a more economical and speedy administration of justice, your memorialists pray your honorable body that a change be made in said organic act increasing the jurisdiction of justices of the peace to three hundred (\$300) dollars.

Resolved, That our delegate in Congress, the Hon. John N. Goodwin, be requested to use all honorable means to bring this subject to the favorable consideration of Congress. That his excellency the governor of this Territory be requested to forward this memorial to the Hon. John N. Goodwin.

GRANVILLE H. OURY,

Speaker of the House of Representatives.

MARK ALDRICH,

President of the Council.

Approved November 6, 1866.

RICHARD C. McCORMICK.

A true copy of the original on file in my office. Witness my hand and seal of the Territory. Given at Prescott this 8th day of November, A. D. 1866.

[SEAL.]

J. P. T. CARTER,

Secretary of the Territory.

THE
MEMORIAL
OF THE
UNITED STATES
OF AMERICA

IN
RESPONSE
TO A
RESOLUTION
PASSED
BY THE
SENATE
ON
JANUARY 11, 1882

BY
THE
COMMISSIONERS
OF THE
LAND OFFICE

IN
ANSWER
TO A
RESOLUTION
PASSED
BY THE
SENATE
ON
JANUARY 11, 1882

BY
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JANUARY 11, 1882

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PASSED
BY THE
SENATE
ON
JANUARY 11, 1882

BY
THE
COMMISSIONERS
OF THE
LAND OFFICE

AMEND ORGANIC ACT.

MEMORIAL

OF

THE LEGISLATURE OF MONTANA,

ASKING

Congress to amend the organic act so as to extend the jurisdiction of justices of the peace.

JANUARY 21, 1867.—Ordered to be printed and referred to the Committee on the Territories.

HOUSE JOINT MEMORIAL asking Congress to amend the organic act so as to extend the jurisdiction of justices of the peace.

Whereas, by the organic act, the jurisdiction of justices of the peace in this Territory is limited to sums not exceeding one hundred dollars; and whereas, owing to the peculiar nature of much of the property in a mining community, delays in determining the rights of parties thereto are particularly injurious; and whereas, owing to the comparative high prices of most kinds of property in this Territory, many cases which in other States and Territories would come within the jurisdiction of justices' courts are here beyond such jurisdiction: Therefore,

Be it resolved by the council and house of representatives of Montana Territory:

SECTION 1. That Congress is hereby earnestly requested to amend the organic act of this Territory so as to allow justices of the peace jurisdiction in all sums not exceeding five hundred dollars.

SECTION 2. That his excellency Governor Green Clay Smith be respectfully requested to transmit copies of this memorial to the Speaker of the House of Representatives and the President of the Senate, with the request that they be laid before their respective bodies, and that our delegate in Congress be respectfully requested to use his efforts to secure the passage of the amendments as asked for in memorial.

A. E. MAYHEW,

Speaker of the House of Representatives.

CHARLES S. BAGG,

President of the Council.

Approved December 14, 1866.

GREEN CLAY SMITH,

Governor.

ARMY ORGANIZATION

MEMORIAL

THE LEGISLATURE OF MONTANA

1850

Resolved, That the Legislature of Montana do hereby memorialize the President of the United States, and the Congress of the United States, in relation to the following matters:

First, That the Legislature of Montana do hereby memorialize the President of the United States, and the Congress of the United States, in relation to the following matters:

Second, That the Legislature of Montana do hereby memorialize the President of the United States, and the Congress of the United States, in relation to the following matters:

Third, That the Legislature of Montana do hereby memorialize the President of the United States, and the Congress of the United States, in relation to the following matters:

Fourth, That the Legislature of Montana do hereby memorialize the President of the United States, and the Congress of the United States, in relation to the following matters:

Fifth, That the Legislature of Montana do hereby memorialize the President of the United States, and the Congress of the United States, in relation to the following matters:

A. M. MATHESON,
Speaker of the House of Representatives.
CHARLES S. HARRIS,
President of the Senate.
GREEN CLAY SMITH,
Governor.

POST ROUTES AND POST OFFICES.

MEMORIAL
OF
THE LEGISLATURE OF MONTANA,
ASKING FOR

The establishment of post routes and post offices in Montana Territory.

JANUARY 21, 1867.—Ordered to be printed and referred to the Committee on the Post Offices and Post Roads.

COUNCIL JOINT MEMORIAL to Congress, asking for the establishment of post routes and post offices in Montana Territory.

To the honorable the Senate and House of Representatives of the United States of America in Congress assembled, and the Postmaster General of the United States:

We, your memorialists, the legislative assembly of the Territory of Montana, do respectfully represent to your honorable body that the people of this Territory pay their national taxes for the purpose of supporting the government of the United States as punctually as other portions of the government; and whereas there are but few post offices in said Territory, several of the best and most fertile counties having none at all, the citizens thereof having to depend entirely upon private express for their letters and papers, at exorbitant charges, costing annually many thousand dollars to the inhabitants of said Territory: We, therefore, would earnestly appeal to Congress to establish a mail route from Virginia City, via Sterling, Gallatin City, Nelson's crossing of the West Gallatin river, Fort Gallatin, to Bozeman City—the mail to be carried once a week, on horseback; and to establish post offices at the following places, viz: Sterling, Madison county, and at Gallatin City, Nelson's crossing, Fort Gallatin, and Bozeman, in Gallatin county; since there is not a post office in the county of Gallatin, having a voting population of over six hundred, and being one of the best grain-growing counties in the Territory, if not in the world. We, your memorialists, would further represent to your honorable body that the county of Meagher is also without a post office, with a population but little short of any county in the Territory, having a large area of tillable land and being one of the richest in mineral resources in the Territory. We, therefore, earnestly urge upon your honorable body the propriety of establishing a post office in Diamond City, as there has been a post route established from Helena to said point; also to establish a post route from Helena, in Edgerton county

to New York, in Meagher county, and a post office at said place; also, a post route from Deer Lodge City to Beartown, a distance of seven miles, and a post office at said Beartown, in Deer Lodge county, and at Elk creek; also, to establish post offices and post roads at such other places in this Territory as shall be just and proper; and your memorialists will, as in duty bound, ever feel grateful.

A. E. MAYHEW,

Speaker of the House of Representatives.

CHAS. S. BAGG,

President of the Council.

Approved, December 15, 1866.

GREEN CLAY SMITH,

Governor.

AMENDMENT OF THE CONSTITUTION.

LETTER

FROM

THE GOVERNOR OF THE STATE OF WEST VIRGINIA,

TRANSMITTING

Resolution of that State ratifying the fourteenth article of the Constitution of the United States.

JANUARY 25, 1867.—Laid on the table and ordered to be printed.

JOINT RESOLUTION ratifying the amendment proposing a 14th article to the Constitution of the United States.

Whereas the Senate and House of Representatives of the United States of America in Congress assembled, by a concurrent vote of two-thirds of both houses, have proposed to the legislatures of the several States the following amendment to the Constitution of the United States, to be classified as Article XIV of the amendments to said Constitution, namely :

ARTICLE XIV.

SECTION 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

SEC. 2. Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice-President of the United States, representatives in Congress, the executive or judicial officers of a State, or the members of the legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

SEC. 3. No person shall be a senator or representative in Congress, or elector for President and Vice-President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath as a

member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may, by a vote of two-thirds of each house, remove such disability.

SEC. 4. The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

SEC. 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

Resolved by the legislature of West Virginia, That the said proposed amendment is hereby ratified.

Adopted January 16, 1867.

STATE OF WEST VIRGINIA,

Clerk's Office, House of Delegates, ss :

I, William P. Hubbard, clerk of the house of delegates and keeper of the rolls of said State, certify that the foregoing is a faithful transcript from the records of this office.

Given under my hand this 21st day of January, A. D. 1867.

WILLIAM P. HUBBARD,

Clerk House of Delegates and Keeper of the Rolls.

STATE OF WEST VIRGINIA,

Office Secretary of the State, ss :

I, Granville D. Hall, secretary of the State aforesaid, certify that William P. Hubbard, whose name is subscribed to the foregoing certificate, is clerk of the house of delegates and keeper of the rolls of this State, duly elected and qualified as such, and as such is authorized to certify copies from the record of the acts of the legislature. And I further certify that his signature to said certificate is genuine.

In testimony whereof, I hereunto set my hand and affix the great seal of the said State, at my said office in the city of Wheeling, this 21st day of [SEAL.] January, A. D. 1867.

GRANVILLE D. HALL,

Secretary of the State.

AID TO UNION PACIFIC RAILROAD.

RESOLUTION

OF

THE LEGISLATURE OF KANSAS,

ASKING FOR

Aid to the Union Pacific Railway, southern branch.

JANUARY 25, 1867.—Referred to the Committee on the Pacific Railroad and ordered to be printed.

Whereas the Congress of the United States of America has, by act approved July 1, 1862, and by the amended act approved July 2, 1864, provided for the early construction of the Union Pacific railway, with its several branches, via the Central Pacific railroad of California, the Union Pacific railway, eastern division, the Sioux City branch, and the Union Pacific Central branch, for the special and complete accommodation of the commerce and travel of the States that were known as free States prior to the rebellion; and

Whereas the great commercial and railroad interests of the southwest portions of the nation are left wholly unprovided with railroad communication with the great national system of railways; and

Whereas the Cherokee nation, the States of Arkansas and Tennessee, the Boards of Trade of Memphis and New Orleans have asked by memorial, and justice demands, that Congress recognize the claim, and grant to the Union Pacific railway, southern branch, (the same being a corporation under the laws of the State of Kansas,) equal subsidies as are granted the aforementioned branch roads; and

Whereas the Union Pacific railway, southern branch, is of great national and commercial importance, and of vast interest to the State of Kansas: Therefore,

Resolved by the senate, (the house concurring,) That the Congress of the United States of America be, and is hereby, earnestly asked, to grant to the Union Pacific railway, southern branch, like or equal aid as has been granted the aforesaid branch roads.

Resolved, That the secretary of state forward to the President of the Senate and Speaker of the House, and to each of our senators and member in Congress, a copy of the foregoing preamble and resolution.

Adopted by the senate January 16, 1867.

ALEX. R. BANKS, *Secretary.*

Concurred in by the house of representatives January 16, 1867.

JOHN S. MORTON,

Chief Clerk, House of Representatives.

I, R. A. Barker, secretary of state, do hereby certify that the foregoing is a true and correct copy of the original on file in my office.

In testimony whereof, I have set my hand and affixed the great seal of the
[SEAL.] State, this 19th day of January, A. D. 1867.

R. A. BARKER, *Secretary of State.*

SETTLERS ON OSAGE LANDS.

RESOLUTION

OF

THE LEGISLATURE OF KANSAS,

PRAYING

The passage of a bill extending the benefit of the Homestead Law to the settlers on the lands recently purchased from the Osage Indians.

JANUARY 25, 1867.—Referred to the Committee on the Public Lands and ordered to be printed.

Be it resolved by the senate, (the house of representatives concurring therein,) That the Congress of the United States be, and they are hereby, memorialized to extend, if consistent with the public interest, the benefit of the homestead law to the settlers on the lands recently purchased from the Osage Indians, and known as the east treaty.

Be it further resolved, That the secretary of state be instructed to forward a certified copy of these resolutions to each of our senators and our representative in Congress, and a copy to the Secretary of the Interior, who are hereby requested to bring the subject to the attention of that body at as early a day as practicable.

Adopted by the senate, January 16, 1867.

ALEX. R. BANKS,
Secretary of the Senate.

Concurred in by the house of representatives, January 17, 1867.

JOHN S. MORTON,
Chief Clerk.

I, R. A. Barker, secretary of state, do hereby certify that the foregoing is a true and correct copy of the original on file.

In testimony whereof, I have subscribed my name and affixed the great seal of the State, January 17, 1867.

[SEAL.]

R. A. BARKER,
Secretary of State.

CHEROKEE NEUTRAL LANDS.

RESOLUTION

OF

THE LEGISLATURE OF KANSAS,

PRAYING

The passage of Senate bill No. 489, giving right of pre-emption to settlers on the Cherokee neutral lands in Kansas.

JANUARY 25, 1867.—Referred to the Committee on Public Lands and ordered to be printed.

Whereas a bill has been introduced into the United States Senate, numbered 489, and entitled "A bill to provide for giving the right of pre-emption to settlers on the Cherokee neutral lands in Kansas, and for other purposes;" and whereas we regard the provisions of the treaty under which those lands were ceded to the United States not only indefinite, but of such a nature that without additional legislation great injustice will be done to numerous settlers who have located there for the purpose of securing permanent homes and developing the resources of the soil; and whereas we are of the opinion that such an act is of the greatest importance, not only in the avoidance of much trouble among the settlers, but in promoting the material interest of the State and general government: Therefore,

Resolved by the senate, (the house concurring,) That on behalf of ten thousand settlers on those lands, and for the reasons above set forth, we respectfully memorialize Congress that it do pass said Senate bill No. 489.

Resolved, That the secretary of state be, and he is hereby, instructed to forward to our senators and representative in Congress, and to the presiding officers of each house in Congress, each a certified copy of this resolution.

Adopted by the senate January 16, 1867.

ALEX. R. BANKS,
Secretary of the Senate.

Concurred in by the house of representatives January 17, 1867.

JOHN S. MORTON,
Chief Clerk.

I, R. A. Barker, secretary of state, do hereby certify that the foregoing is a true and correct copy of the original on file in my office.

In testimony whereof, I have subscribed my name and fixed the great seal of the State this 17th day of January, A. D. 1867.

SEAL.]

R. A. BARKER,
Secretary of State.

CAPITOL IN DAKOTA.

MEMORIAL

OF THE

LEGISLATIVE ASSEMBLY OF THE TERRITORY OF DAKOTA,

ASKING AN

Appropriation to erect a capitol building at the seat of government in Dakota Territory.

JANUARY 25, 1867.—Referred to the Committee on Appropriations and ordered to be printed.

To the honorable the Senate and House of Representatives of the United States in Congress assembled:

Your memorialists, the legislative assembly of the Territory of Dakota, would respectfully represent that, while Congress has uniformly made appropriations for the erection of capitol buildings in the several Territories of the United States, the Territory of Dakota has received no aid from the general government for such a purpose; and deeming the matter of sufficient importance to demand your attention, the general government as well as the Territory of Dakota being interested therein, we respectfully ask that this subject be considered by your honorable bodies. Your memorialists would represent that the building at present occupied by the several federal officers, and in which the sessions of the legislative assembly are annually held, are illy suited for such purposes, being uncomfortable during the season in which, by law, the legislature holds its sessions, and the several officers are compelled to be constantly at their places of business; and we would further represent that the rents annually paid for the present buildings used and occupied, for which the general government is responsible, would, in a few years, pay the expense of erecting a suitable building for the accommodation of the various federal officers and the legislative assembly.

Your memorialists would further represent that, as at present situated, the valuable papers, records, documents, &c., are without a secure place wherein they can be safe from destruction by fire or from theft, and we regard their preservation of vital consequence to our Territory.

Your memorialists regard this matter of paramount importance to Dakota, and would therefore pray that you will appropriate forty thousand dollars for the erection of a capitol building at the seat of government in Dakota Territory. And your memorialists, as in duty bound, will ever pray.

Be it resolved by the legislative assembly of the Territory of Dakota, That a copy of this memorial be forwarded to the Speaker of the House of Represent-

atives and President of the Senate of the United States Congress, and one copy to our delegate in Congress; and, further, that his excellency the governor be requested to sign this memorial, and to unite with us in urging and securing a favorable response to this memorial.

J. B. S. TODD, *Speaker.*

F. WIXSON, *Chief Clerk.*

M. K. ARMSTRONG,
President of Council.

B. M. SMITH,
Secretary of Council.

YANKTON, D. T., January 10, 1867.

Approved:

A. J. FAULK, *Governor.*

CITIZENS OF WESTERN TEXAS.

MEMORIAL

ON BEHALF OF

THE CITIZENS OF WESTERN TEXAS,

SETTING FORTH

The grievances of the loyal Union men of that State; the oppressions by the government established by President Johnson, and by the disloyal majority under his government, encouragement, and protection, and praying that the loyal Union men of western Texas may be protected by law, and allowed to erect a State government west of the Brazos river.

JANUARY 28, 1867.—Referred to the Committee on Reconstruction and ordered to be printed.

To the honorable the Senate and the House of Representatives in Congress assembled:

The undersigned, loyal citizens of western Texas, most respectfully call the attention of your honorable bodies to their present political condition.

During the existence of the rebellion the Union element of western Texas was perhaps greater than that of any portion of the original seven seceding States. This brought upon them persecutions and hardships unknown in the annals of warfare, for no other reason than because of their Union sentiments and love for a government from which they had never derived anything but kindness.

They were forced into a service which they believed criminal, and detested, or to abandon the country of their birth or adoption, to find safety among strangers, or to be summarily executed at a rope's-end. These persecutions many Union men in western Texas endured for four years, sustained by the hope that in the end the Union armies would triumph over the enemies of the country, and that safety and liberty would again be secured to every one. It was a matter of pride to those who had fought in the cause of the Union to think they should enjoy the rewards of their faithful conduct towards their government.

Finally the arms of the Union triumphed, and the rebellion was crushed. The last organized force surrendered in Texas in May, 1865. The rebels at the time were not only conquered, but subdued. They were ready and willing to submit to any terms offered by the United States government. No one then dreamed of the enjoyment of political "rights" on the part of the people of Texas. The State of Texas had lost its political organization, as well by

the expiration of the terms of all its officers as by act of rebellion on the part of its inhabitants. The belligerent organization called the State of Texas (of the Confederate States) was totally destroyed when overcome by the Union armies. There existed after the surrender not an officer in the whole limits of Texas except the officers of the United States government. The people of Texas were wholly without civil government. In appointing Governor Holden, of North Carolina, the President says the same thing of that State. Then it is true the people of the State of Texas were not out of the Union, nor was the territory composing said State. Both were in the limits and protection of the Union; but the inhabitants were without any civil organization or government, nor were they capable of organizing a government without the consent of those to whom they had surrendered. The constitution and laws formerly in force existed only on parchment and paper, as they did after they were enacted and before organization under them.

The President, as commander-in-chief, assumed to institute a civil government for this people so situated. But not contented to appoint loyal governors and officers for the protection of the people in their rights and property, where the same could not conveniently be protected by the military authorities, he called the rebels together to choose their own form of government, and committed the civil powers of government into their own hands. Thenceforth all Union citizens, black as well as white, were committed to the protection of the rebels, who numbered about five to one in the State. This inevitably would have resulted in their being driven out of the State or into bondage had it not been for the troops stationed at different points in the State. These men, mad with their success in regaining power, boldly proclaimed the Congress of the United States a usurping power or body of men, whom the President would drive from the halls of legislation. Vengeance was threatened against every man who dared to oppose such a scheme. Instead of treason being made odious, devotion to the Union has ever since been stigmatized as odious. Prior to the result of the late elections at the North no Union man considered himself safe in the State. Servitude, under a yoke far more galling than that of slavery, was the only prospect of the poor black, and expulsion from the State the only safety of the obstinate and determined Union man. Without the intervention of Congress, as herein prayed, the same fate awaits both classes in the future.

The rebel convention convened by the President, the people, and the first legislature of this new State, have given unmistakable proofs of their hatred to a republican form of government, and disloyalty to the United States. In their organic law they require a residence of five years to become eligible for a senator or representative, and seven years to become eligible as governor, a thing unprecedented in the history of the States. They annulled the secession ordinance, but recognized its full force and effect till the day of annulment; they forever excluded a large portion of citizens from a participation in the common school fund, and only granted them partial privileges in courts of justice, for no other reason than because of their caste or color.

In the popular elections, under the constitution, four out of five of the judges of the supreme court, and sixteen out of twenty of the district court, were chosen because of their political opinions, which held that secession was the rightful exercise of a constitutional power on the part of a State, and that every act under the ordinance of secession must be upheld and supported; and at a subsequent election, four members of Congress were chosen, neither of whom can take the test-oath.

The acts of the legislature have been still more hostile to the Congress and government of the United States, and injurious to the citizens of Texas. They violated their duty in electing to the Senate of the United States men who, they knew could not take the test-oath; they passed a bill to regulate contracts for labor, which was designed to enslave the blacks, and to exclude from the country

all laboring whites. By a new arrangement of the judicial districts they legislated out of office the only four Union men elected in the State. In this dismissal of officers elected by the people they disfranchised, in western Texas, over 3,000 voters, and added two districts, casting that number of votes, to two others not casting more than half the number, and this upon no other plea or excuse than that the persons elected in the former were Union men and would hold persons accountable for crimes committed during the days of the rebellion. They divided the congressional districts in such manner as to preclude the possibility of electing a Union man; or even of electing a person west of the Colorado river. They passed laws staying the collection of debts, and thus destroying our credit. To avoid Union men as judges, already elected, they placed counties in the same judicial district seven hundred miles apart, and a wilderness infested by Indians intervening. They utterly refused to ratify the amendment to the Constitution of the United States, because it excluded from office persons who had committed treason against the United States. Under the system of the labor contract law, the apprentice law, the vagrant law, and county courts newly organized, we consider slavery existing in a more odious form than heretofore. They not only manifested a disposition to heap all honors and emoluments upon persons of declared rebel sentiments, but to expend the public treasure in the support and education of rebel soldiers and their families. By an artful system of donation of the public funds they laid the foundation for imposing upon the people the payment of the entire rebel debt of the State. They execrated the remains of any dead Union soldiers, and sought to have them removed from the cemetery where they were interred. We might swell this catalogue to an indefinite length and embrace the declarations for the last six months of every secession paper in the State. But we have already said enough to let you know that the Union men of western Texas look to Congress alone for protection. They must receive this protection or they will be compelled to abandon the country and seek homes elsewhere.

They believe it is the duty of Congress to provide for the organization of a government for the people of this State. It is not in the power of the President to incorporate or establish civil government. A corporation or government can only be created by the law-making power. Since the rebellion began there has existed no rightful law-making power in this State but the Congress of the United States. Nor can any such power ever exist without the consent or recognition of Congress, unless the country be conquered.

We then ask Congress to provide for a government, and in doing so, that the government be placed in the hands of those who are known to be loyal.

As the articles of annexation of Texas to the United States contemplate as many as five States within the territory or limits of Texas, provided the consent of the legislature of the State be given, we ask that a separate State be erected in western Texas, the east line not to go farther east than the divide between the Colorado and Brazos, or the Brazos river at farthest.

At the last election there were cast for E. M. Pease, west of the line first named, about 7,000 votes, while he only received about 13,000 in the whole State. Thus more than one-half the Union vote was given in this portion of Texas, in a population of only about one-fourth of all the voters of the State.

But it is confidently believed a decided majority of the people in this portion of Texas, if in a separate State organization, would prove firm supporters of the Union. Besides, our interests are of a character very different from those of northern and eastern Texas.

As we now have no legislature to give its consent to the erection of a new State, we humbly pray that the Congress of the United States allow the people of western Texas a separate organization, and that they be allowed to adopt their own form of government. And the undersigned assume the responsibility

of saying that the above is the opinion of almost every Union man in western Texas. There may be a few exceptions among old Texans, who attach great importance to the *greatest* State in the Union, and the glories of San Jacinto and the Alamo.

All of which is respectfully submitted :

J. A. PASCHAL.

EDWARD DEGEVIER.

W. R. BACON, of El Paso county.

THOS. H. STRIBLING.

PH. BRAUBACH.

GEO. W. BRACKENRIDGE.

JOHN A. CHANEY.

LADISLAUS UJHAZI, late of Hungary.

A. O. COOLEY, late of Gillespie county.

WM. E. JONES.

DR. TH. HERTZBERG.

V. COMIDERARY.

DR. A. SCHLOEMANN.

JESSE STANCEL.

W. B. COFFEE.

GEO. W. PASCHAL.

SAN ANTONIO, TEXAS,
December 17, 1866.

THE MILITIA.

[To accompany bill H. R. No. 914.]

LETTER

FROM

THE GOVERNOR OF MICHIGAN,

RELATIVE TO

The bill for the better organization of the militia.

JANUARY 29, 1867.—Referred to the Committee on the Militia and ordered to be printed.

STATE OF MICHIGAN, EXECUTIVE OFFICE,

Lansing, January 23, 1867.

DEAR SIR: I am in receipt of your favor of the 7th instant enclosing your proposed militia bill, and requesting that I would examine the same, and make such suggestions as might occur to me for its improvement, &c. In accordance with your further request I have brought the bill to the notice of our adjutant general, and after a consultation with him on the subject I have directed that officer to embody our views in a statement of proposed amendments, accompanied by his report to myself.

Enclosed I have the honor to transmit to you this report with said proposed amendments, in all which I concur. I also enclose herein a special report of our adjutant general to myself, recently made, in relation to the reorganization of the military forces of this State, but previously to the receipt of your bill.

The legislature of this State are now in session, and I most earnestly hope that Congress may be able to take some decisive action upon this important subject at an early day, in order that we may adopt such State legislation as will harmonize with the action of Congress.

I have the honor to be, very truly, yours, &c.,

HENRY H. CRAPO,
Governor of Michigan.

Hon. H. E. PAINE,

Military Committee, House of Representatives, Washington, D. C.

MILITARY DEPARTMENT, MICHIGAN, ADJUTANT GENERAL'S OFFICE,

Detroit, January 22, 1867.

SIR: Having been directed by your excellency to examine the bill introduced by the Hon. Mr. Paine in the House of Representatives, January 3, 1867, "to provide for organizing, arming, and disciplining the militia, and for other purposes," and to make such suggestions in relation thereto as I might deem

proper, I have, therefore, the honor most respectfully to submit the enclosed schedule of proposed amendments, with some notes in relation thereto, and in regard to supposed omissions in the bill referred to. They are not made, nor intended, as objecting to or opposing the portions of the bill which they profess to amend, but are submitted more for the purpose of calling attention to them, as being, in my judgment, susceptible of alteration and improvement in the direction indicated, and of respectfully expressing an opinion that the bill might be improved by the adoption of amendments and additions of a similar import.

The general plan set forth in the bill referred to is feasible, well conceived, and exhaustive in its character, and I am satisfied that in the main it cannot be improved upon, being, in my humble opinion, the only one practicable for a popular, permanent, and efficient organization of an active uniform militia for the various States, universally acknowledged to be so necessary.

Its success, so far as the numerical strength of the organization proposed and the result desired are concerned, is properly and mainly based and depending on patriotism, which should always be recognized by our citizen soldiery as a greater inducement to serve their country than pecuniary reward. Its requirements as to qualifications for membership are, in part, most wisely made dependent upon loyalty, which should *now* be one of the tests as to fitness in any one to serve the country. It is extremely liberal toward the States in its provisions, and also toward those who are intended to constitute the proposed force, and is as economical as a due regard for encouragement will admit of. It is well guarded in every respect. It provides for as much encouragement, and will be as conducive as to the result desired, as any militia law possibly can without incurring an expense which would be objectionable, and will be as forcible and binding as is possible without resorting to a draft. While the force which it proposes to organize would be ample as a protection to the States, it would, at the same time, be available and reliable, possessing strength sufficient to prevent any possibility of inaugurating rebellion, and would also be ready, when required, to take the defensive in repelling foreign aggression, or to assume the offensive in redressing an insult offered the nation.

The proposed national guard schools, if adopted, would add much to the military education of the country, and would establish a just and liberal policy with regard to admission into the Military Academy, and also as to appointments in the regular army.

I strongly recommend to your excellency that the plan may receive your most favorable consideration and indorsement.

Very respectfully, your obedient servant,

JNO. ROBERTSON,

Adjutant General.

His Excellency HENRY H. CRAPO,

Governor of Michigan, Lansing, Mich.

INDIAN AFFAIRS.

LETTER

FROM

THE SECRETARY OF WAR,

ADDRESSED TO

Mr. Schenck, chairman of the Committee on Military Affairs, transmitting a report by Colonel Parker on Indian affairs.

JANUARY 30, 1867.—Ordered to be printed.

WAR DEPARTMENT,

Washington City, January 25, 1867.

SIR: I have the honor to transmit herewith a report on Indian affairs, prepared by Colonel Parker, aide-de-camp, for the information of your committee.

Very respectfully, sir, your obedient servant,

EDWIN M. STANTON,

Secretary of War.

Hon. R. C. SCHENCK,

Chairman of Military Committee House of Representatives.

HEADQUARTERS ARMIES OF THE UNITED STATES,

Washington, D. C., January 24, 1867.

GENERAL: In compliance with your request, I have the honor to submit the following proposed plan for the establishment of a permanent and perpetual peace, and for settling all matters of differences between the United States and the various Indian tribes.

I am, very respectfully, your obedient servant,

E. S. PARKER,

Colonel and Aide-de-Camp.

General U. S. GRANT,

Commanding armies of the United States.

First. The retransfer of the Indian bureau from the Interior Department back to the War Department, or military branch of the government, where it originally belonged, until within the last few years.

The condition and disposition of all the Indians west of the Mississippi river, as developed in consequence of the great and rapid influx of immigration by reason of the discovery of the precious metals throughout the entire west, ren-

ders it of the utmost importance that military supervision should be extended over the Indians. Treaties have been made with a very large number of the tribes, and generally reservations have been provided as homes for them. Agents appointed from civil life have generally been provided to protect their lives and property, and to attend to the prompt and faithful observance of treaty stipulations. But as the hardy pioneer and adventurous miner advanced into the inhospitable regions occupied by the Indians, in search of the precious metals, they found no rights possessed by the Indians that they were bound to respect. The faith of treaties solemnly entered into were totally disregarded, and Indian territory wantonly violated. If any tribe remonstrated against the violation of their natural and treaty rights, members of the tribe were inhumanly shot down and the whole treated as mere dogs. Retaliation generally followed, and bloody Indian wars have been the consequence, costing many lives and much treasure. In all troubles arising in this manner the civil agents have been totally powerless to avert the consequences, and, when too late, the military have been called in to protect the whites and punish the Indians, when if, in the beginning, the military had had the supervision of the Indians, their rights would not have been improperly molested, or if disturbed in their quietude by any lawless whites, a prompt and summary check to any further aggressions could have been given. In cases where the government promises the Indians the peaceable and quiet possession of a reservation, and precious metals are discovered or found to exist upon it, the military alone can give the Indians the needed protection and keep the adventurous miner from encroaching upon the Indians until the government has come to some understanding with them. In such cases the civil agent is absolutely powerless.

Most of Indian treaties contain stipulations for the payment annually to Indians of annuities, either in money or goods, or both, and agents are appointed to make these payments whenever government furnishes them the means. I know of no reason why officers of the army could not make all these payments as well as civilians. The expense of agencies would be saved, and, I think, the Indians would be more honestly dealt by. An officer's honor and interest is at stake, and impels him to discharge his duty honestly and faithfully, while civil agents have none of those incentives, the ruling passion with them being generally to avoid all trouble and responsibility, and to make as much money as possible out of their offices.

In the retransfer of this bureau I would provide for the complete abolishment of the system of Indian traders, which, in my opinion, is a great evil to Indian communities. I would make government the purchaser of all articles usually brought in by Indians, giving them a fair equivalent for the same in money or goods at cost prices. In this way it would be an easy matter to regulate the sale or issue of arms and ammunition to Indians, a question which of late has agitated the minds of the civil and military authorities. If the entry of large numbers of Indians to any military post is objectionable, it can easily be arranged that only limited numbers shall be admitted daily.

By an act approved March 16, 1802, it was made the duty of military agents "to purchase, receive, and forward to their proper destination all military stores and other articles for the troops in their respective departments, and all goods and annuities for the Indians, which they may be directed to purchase, or which shall be ordered into their care by the Department of War." In the retransfer of the Indian bureau, this act, so far as it relates to the Indians, could be revived, as well as the act of June 30, 1834, which authorizes "the President to require any military officer of the United States to execute the duties of Indian agent."

With reference to the discontinuance of the present Indian trading system, the arguments set forth in President Jefferson's confidential message, dated January 18, 1803, seem more cogent now than at that time. He says: "The

Indian tribes residing within the limits of the United States have, for a considerable time, been growing more and more uneasy at the constant diminution of the territory they occupy, although effected by their own voluntary sales; and the policy has long been gaining strength with them of refusing absolutely all further sales on any conditions; insomuch that at this time it hazards their friendship and excites dangerous jealousies and perturbations in their minds to make any overture for the purchase of the smallest portions of their land. A very few tribes only are not yet obstinately in these dispositions. In order peaceably to counteract this policy of theirs, and to provide an extension of territory which the rapid increase of our numbers will call for, two measures are deemed expedient: First, to encourage them to abandon hunting, to apply to the raising stock, to agriculture, and domestic manufactures, and thereby prove to themselves that less land and labor will maintain them in this better than in their former mode of living. The extensive forests necessary in the hunting life will then become useless, and they will see the advantage in exchanging them for the means of improving their farms and of increasing their domestic comforts. Secondly, to multiply trading-houses among them, and place within their reach those things which will contribute more to their domestic comfort than the possession of extensive but uncultivated wilds. Experience and reflection will develop to them the wisdom of exchanging what they can spare and we want for what we can spare and they want. In leading them thus to agriculture, to manufactures, and civilization, in bringing together their and our settlements, and in preparing them ultimately to participate in the benefits of our government, I trust and believe we are acting for their greatest good. At these trading-houses we have pursued the principles of the act of Congress which directs that the commerce shall be carried on liberally, and requires only that the capital stock shall not be diminished. We consequently undersell private traders, foreign and domestic; drive them from the competition, and thus, with the good will of the Indians, rid ourselves of a description of men who are constantly endeavoring to excite in the Indian mind suspicions, fears, and irritations towards us. A letter now enclosed, shows the effect of our competition on the operations of the traders, while the Indians, perceiving the advantage of purchasing from us, are soliciting generally our establishment of trading-houses among them."

The Indian department has increased to such magnitude since this was written that every argument advanced has a tenfold more force than at that date. And had the policy then advocated been adopted and steadily pursued to this day, there is no doubt that great good would have resulted, bloody wars been averted, and many valuable lives saved. It is believed that a return now to the wise and humane measures advocated by the fathers of the republic would still result beneficially to the government and the Indian races. Some definite and permanent policy should be adopted, and circumstances made to bend to its establishment.

In 1793 General Washington, then President, remarks in a special message to Congress, that "next to a vigorous execution of justice on the violators of peace, the establishment of commerce with the Indian nations, on behalf of the United States, is most likely to conciliate their attachment. But it ought to be conducted without fraud, without extortion, with constant and plentiful supplies; with a ready market for the commodities of the Indians, and a stated price for what they give in payment and receive in exchange. Individuals will not pursue such a traffic unless they be allured by the hope of profit; but it will be enough for the United States to be reimbursed only."

It is greatly to be regretted that this beneficent and humane policy had not been adhered to, for it is a fact not to be denied, that at this day Indian trading licenses are very much sought after, and when once obtained, although it may be for a limited period, the lucky possessor is considered as having already made his fortune. The eagerness also with which Indian agencies are sought

after, and large fortunes made by the agents in a few years, notwithstanding the inadequate salary given, is presumptive evidence of frauds against the Indians and the government.

Many other reasons might be suggested why the Indian department should altogether be under military control, but a familiar knowledge of the practical workings of the present system would seem to be the most convincing proofs of the propriety of the measure. It is pretty generally advocated by those most familiar with our Indian relations, and so far as I know, the Indians themselves desire it. Civil officers are not usually respected by the tribes, but they fear and regard the military, and will submit to their counsels, advice, and dictation, when they would not listen to a civil agent.

Second. The next measure I would suggest is the passage by Congress of a plan of territorial government for the Indians, as was submitted last winter, or a similar one. When once passed, it should remain upon the statute books as the permanent and settled policy of the government. The boundaries of the Indian territory or territories should be well defined by metes and bounds, and should remain inviolate from settlement by any except Indians and government employés.

The subject of the improvement and civilization of the Indians, and the maintenance of peaceful relations with them, has engaged the serious consideration of every administration since the birth of the American republic; and, if I recollect aright, President Jefferson was the first to inaugurate the policy of the removal of the Indians from the States to the country west of the Mississippi; and President Monroe, in furtherance of this policy, recommended that the Indians be concentrated, as far as was practicable, and civil governments established for them, with schools for every branch of instruction in literature and the arts of civilized life. The plan of removal was adopted as the policy of the government, and, by treaty stipulations, affirmed by Congress; lands were set apart for tribes removing into the western wilds, and the faith of a great nation pledged that the homes selected by the Indians should be and remain their homes forever, unmolested by the hand of the grasping and avaricious white man; and, in some cases, the government promised that the Indian homes and lands should never be incorporated within the limits of any new State that might be organized. How the pledges so solemnly given and the promises made were kept, the history of the western country can tell. It is presumed that humanity dictated the original policy of the removal and concentration of the Indians in the west to save them from threatened extinction. But to-day, by reason of the immense augmentation of the American population, and the extension of their settlements throughout the entire west, covering both slopes of the Rocky mountains, the Indian races are more seriously threatened with a speedy extermination than ever before in the history of the country. And, however much such a deplorable result might be wished for by some, it seems to me that the honor of a Christian nation and every sentiment of humanity dictate that no pains be spared to avert such an appalling calamity befalling a portion of the human race. The establishment of all the Indians upon any one territory is perhaps impracticable, but numbers of them can, without doubt, be consolidated in separate districts of country, and the same system of government made to apply to each. By the concentration of tribes, although in several and separate districts, government can more readily control them and more economically press and carry out plans for their improvement and civilization, and a better field be offered for philanthropic aid and Christian instruction. Some system of this kind has, at different periods in the history of our government, been put forward, but never successfully put into execution. A renewal of the attempt, with proper aids, it seems to me cannot fail of success.

Third. The passage by Congress of an act authorizing the appointment of an inspection board, or commission, to hold office during good behavior, or until

the necessity for their services is terminated by the completion of the retransfer of the Indian bureau to the War Department. It shall be the duty of this board to examine the accounts of the several agencies, see that every cent due the Indians is paid to them promptly as may be promised in treaties, and that proper and suitable goods and implements of agriculture are delivered to them, when such articles are due; to make semi-annual reports, with such suggestions as, in their judgment, might seem necessary to the perfect establishment of a permanent and friendly feeling between the people of the United States and the Indians.

This commission could undoubtedly be dispensed with in a few years, but the results of their labors might be very important and beneficial, not only in supervising and promptly checking the delinquencies of incompetent and dishonest agents, but it would be a most convincing proof to the Indians' mind that the government was disposed to deal honestly and fairly by them. Such a commission might, indeed, be rendered wholly unnecessary if Congress would consent to the next and fourth proposition which I submit in this plan.

Fourth. The passage of an act authorizing the appointment of a permanent Indian commission, to be a mixed commission, composed of such white men as possessed in a large degree the confidence of their country, and a number of the most reputable educated Indians, selected from different tribes. The entire commission might be composed of ten members, and, if deemed advisable, might be divided so that five could operate north and five south of a given line, but both to be governed by the same general instructions, and impressing upon the Indians the same line of governmental policy. It shall be made their duty to visit all the Indian tribes within the limits of the United States, whether, to do this, it requires three, five, or ten years. They shall hold talks with them, setting forth the great benefits that would result to them from a permanent peace with the whites, from their abandonment of their nomadic mode of life, and adopting agricultural and pastoral pursuits, and the habits and modes of civilized communities. Under the directions of the President the commission shall explain to the various tribes the advantages of their consolidation upon some common territory, over which Congress shall have extended the ægis of good, wise, and wholesome laws for their protection and perpetuation. It would be wise to convince the Indians of the great power and number of the whites; that they cover the whole land, to the north, south, east, and west of them. I believe they could easily understand that although this country was once wholly inhabited by Indians, the tribes, and many of them once powerful, who occupied the countries now constituting the States east of the Mississippi, have, one by one, been exterminated in their abortive attempts to stem the western march of civilization.

They could probably be made to comprehend that the waves of population and civilization are upon every side of them; that it is too strong for them to resist; and that, unless they fall in with the current of destiny as it rolls and surges around them, they must succumb and be annihilated by its overwhelming force. In consequence of the gradual extinction of the Indian races, and the failure of almost every plan heretofore attempted for the amelioration of their condition, and the prolongation of their national existence, and also because they will not abandon their savage tastes and propensities, it has of late years become somewhat common, not only for the press, but in the speeches of men of intelligence, and some occupying high and responsible positions, to advocate the policy of their immediate and absolute extermination. Such a proposition, so revolting to every sense of humanity and Christianity, it seems to me, could not for one moment be entertained by any enlightened nation. On the contrary, the honor of the national character and the dictates of a sound policy, guided by the principles of religion and philanthropy, would urge the adoption of a system to avert the extinction of a people, however unenlightened they

may be. The American government can never adopt the policy of a total extermination of the Indian race within her limits, numbering, perhaps, less than four hundred thousand, without a cost of untold treasure and lives of her people, besides exposing herself to the abhorrence and censure of the entire civilized world.

The commission shall assure the tribes that the white man does not want the Indian exterminated from the face of the earth, but will live with him as good neighbors, in peace and quiet. The value of maintaining friendly and brotherly relations among themselves is to be urged upon the tribes, and its continual discussion to be made one of the permanent duties of the commission. They are also to urge constantly the propriety, necessity, and benefit to result from their concentration in certain districts of the country, there to live peaceably as members of the same family, as brothers and friends having the same interests and the same destiny. I am free to admit that the most difficult task for the commission would be to obtain the consent of the Indians to consolidate, by removing into certain defined districts. But by constantly keeping the subject before them, and by yearly visitations, the wisdom and humanity of the policy would gradually develop in the Indian mind, and one by one the tribes would come into the measure, and the whole policy be adopted. There would be very many prejudices to combat and overcome. As members of the great human family, they know and feel that they are endowed with certain rights. They possess fair intellectual faculties. They entertain the most ardent love for the largest liberty and independence. Originally their greatest desire was to be left undisturbed by the overflowing white population that was quietly but surely pressing to overwhelm them, and they have been powerless to divert or stem the current of events. They saw their hunting grounds and fisheries disappear before them. They have been reduced to limits too narrow for the hunter state, and naturally many of them at times have sought by violence the redress of what they conceived to be great and heinous wrongs against their natural rights. Though ignorant, in the common acceptation of the term, they are a proud people, and quickly resent the least suspicion of dictation in the government of their actions, come from what quarter it may. Most of the tribes are eminently subject to the influence and control of interested, unprincipled, and crafty individuals, who, to retain their influence and power, would oppose the idea of a consolidation of the tribes, because now they are something, while under the new order of things they might be nothing. They will pander to the prejudices of their people by preaching the sanctimoniousness of their separate creation, nationality, and customs, and claim that as their Creator made them, so they must ever remain. They flatter the pride of the Indian mind. Their reasoning is specious, but yet it is all sophistry.

To combat and overcome such influences the commission would have much labor to perform. It may be imagined that a serious obstacle would be presented to the removal of the Indians from their homes on account of the love they bear for the graves of their ancestors. This, indeed, would be the least and last objection that would be raised by any tribe. Much is said in the books about the reverence paid by Indians to the dead, and their antipathy to deserting their ancestral graves. Whatever may have been the customs for the dead in ages gone by, and whatever pilgrimages may have been made to the graves of their loved and distinguished dead, none of any consequence exists at the present day. They leave their dead without any painful regrets or the shedding of tears. And how could it be otherwise with a people who have such indefinite and vague ideas of a future state of existence, and to my mind it is unnatural to assume or suppose that the wild and untutored Indian can have more attachment for his home, or love for the graves of his ancestors, than the civilized and enlightened Christian.

The appointment of a number of reputable educated Indians upon this com-

mission is suggested because they are familiar with the best modes of communicating with the tribes, whether friendly or unfriendly; they are familiar with the peculiarities of the Indian mind, and know how to make the desired impression upon it, and it would add greatly to the confidence of the tribes in the earnestness, sincerity, and humanity of the government.

The commission shall be required to invite and hear all complaints from the Indians, transmit them verbatim to Washington, and communicate to the Indians the answers thereto. If the complaints be against any agent or citizen of the United States, such agent or citizen shall be furnished with a correct copy of the complaint, an answer thereto obtained, when all the papers in the case shall be sent to Washington, a prompt decision given upon the same, and returned to the commission for promulgation to the parties interested. In my opinion nothing could occur that would tend more strongly to advance the happiness of the Indians, and attach them firmly to the United States government, than the realization of the benefits of an impartial dispensation of justice among themselves and between them and the whites. It has been lately suggested that Indian agents be vested with magisterial powers to administer and dispense justice among the Indians, and between Indians and the whites. Such a plan does not seem to me practicable, because the agent would be absolutely powerless to enforce his judgments, not only against the Indians, but against the whites. If, however, the Indian business is retransferred to the military branch of the government, officers acting as Indian agents could act efficiently as magisterial officers, because they could always have troops to enforce their decrees, and such a measure I should deem very desirable, and I think would result in the greatest good in checking mischief, by summarily punishing lawlessness and crime, whether committed by whites or Indians.

Most of the tribes would have to be visited several times by the commission before the Indian mind would come to a conclusion upon the matters and things that might from time to time be submitted to them, and the government and people of the United States would be compelled to exercise the Christian virtue of patience, until the aboriginal mind was fully prepared and ripened to adopt the plans of the government, when general councils of tribes could be called and a permanent union or confederation of peace formed among themselves and the United States, and they be made to settle down upon lands within certain defined and permanent limits and bounds, where ample aid and protection could be easily and economically afforded them.

No suggestions have been made regarding the disposition of lands at present held or occupied by the tribes, or their annuities, or the amount and kind of aid they ought to receive when concentrated within defined districts, it being deemed premature to discuss such questions now, as circumstances and future legislation will probably better determine them.

This project, at first blush, may seem to be devised on too extensive a scale, and involving too much expense for an experiment. I cannot so regard it. On the contrary, I believe it to be more economical than any other plan that could be suggested. A whole army of Indian agents, traders, contractors, jobbers, and hangers-on would be dispensed with, and from them would come the strongest opposition to the adoption of this plan, as it would effectually close to them the corrupt sources of their wealth.

In 1865 the Secretary of the Interior estimated the cost to the government of maintaining each regiment of troops operating against the Indians on the frontier at two millions of dollars per annum, and that only a few hundred Indians had been killed. By a recent publication in the newspapers (but whether true or not I cannot say) it was stated that the cost of operations against the Indians during the past year was thirty millions of dollars; that a certain number only of Indians had been killed, each life costing the government sixty thousand dollars. Though the cost of carrying on a war is now

pretty well understood in this country, the expense of an Indian war extending along a frontier of thousands of miles cannot be safely estimated. The expense of the Florida Indian war, against a few Indians, who long refused to leave a country hardly inhabitable by civilized man, it is known, cost millions of treasure and many valuable lives.

The expense of this entire plan for establishing peace, saving lives, making every route of travel across the continent entirely safe, civilizing and perpetuating the Indian race, and developing immense tracts of country now held by hostile bands of Indians, would be but a mere tithe to the amount now annually paid by the government for these purposes. There are plenty of troops already in the Indian country, and after the commission has commenced its labors hostilities would very soon cease. Yet the military would have to be maintained in the country until the labors of the commission were fairly and fully developed, and, if successful, the troops could be moved into or contiguous to the Indian districts, to protect them from frauds and impositions, to maintain them in their just and legal rights, and to act as the magisterial agents of the government. The benefits to result from even a partial success of this plan would, to my mind, justify the government in attempting it, especially as it seems so much more economical than the prosecution of the present Indian policy.

E. S. PARKER.

WAR DEPARTMENT,

Washington City, January 28, 1867.

SIR: I have the honor to transmit herewith, for the consideration of the committee, a report on Indian affairs, of January 25, prepared by General John Pope, United States army.

Very respectfully, sir, your obedient servant,

EDWIN M. STANTON,

Secretary of War.

Hon. R. C. SCHENCK,

*Chairman of Military Committee,
House of Representatives.*

WASHINGTON, D. C., *January 25, 1867.*

GENERAL: In compliance with your suggestions, I have the honor to submit the following leading reasons why the Indian bureau should be retransferred to the War Department. The views which I shall submit are by no means original, but are well-settled opinions of every officer of the army who has had experience of the subject, and are and have been entertained for years by nearly every citizen of the Territories not directly or indirectly connected with the present system of Indian management.

1. Under present circumstances there is a divided jurisdiction over Indian affairs. While the Indians are officially at peace, according to treaties negotiated with them by the civil officers of the Indian bureau, the military forces stationed in the Indian country have no jurisdiction over the Indians, and, of consequence, no certain knowledge of their feelings or purposes, and no power to take any action, either of a precautionary or aggressive character.

The first that is known of Indian hostilities is a sudden report that the Indians have commenced a war, and have devastated many miles of settlements, or massacred parties of emigrants or travellers. By the time such information reaches the military commander the worst has been accomplished, and the In-

dians have escaped from the scene of outrage. Nothing is left to the military except pursuit, and generally unavailing pursuit. The Indian agents are careful never to locate their agencies at the military posts, for reasons very well understood. It is not in human nature that two sets of officials, responsible to different heads, and not in accord either in opinion or purpose, should act together harmoniously; and instead of combined, there is very certain to be conflicting action. The results are what might be expected. It would be far better to devolve the whole management of Indians upon one or the other department, so as to secure at least consistent and uniform policy. At war, the Indians are under the control of the military; at peace, under the control of the civil officers. Exactly what constitutes Indian hostilities is not agreed on; and besides this, as soon as the military forces, after a hard campaign, conducted with great hardship and at large expense, have succeeded in forcing the Indians into such a position that punishment is possible, the Indian, seeing the result and the impossibility of avoiding it, immediately proclaims his wish to make peace. The Indian agent, anxious, for manifest reasons, to negotiate a treaty, at once interferes "to protect" (as he expresses it) the Indians from the troops, and arrests the further prosecution of the military expedition, just at the moment when results are to be obtained by it, and the whole labor and cost of the campaign are lost. The Indian makes a treaty to avoid immediate danger from the troops, without the slightest purpose of keeping it, and the agent knows very well that the Indian does not intend to observe it. While the army is fighting the Indians at one end of the line, Indian agents are making treaties and furnishing supplies at the other end, which supplies are at once used to keep up the conflict. With this divided jurisdiction and responsibility it is impossible to avoid these unfortunate transactions. If the Indian department as at present constituted were given sole jurisdiction of the Indians, and the troops removed, it is certain that a better condition of things would obtain than now exists, since the whole responsibility of Indian wars and their results to unprotected citizens would belong to the Indian bureau alone, without the power of shifting responsibility for consequences upon others. The military officer is the representative of force, a logic which the Indian understands, and with which he does not invest the Indian agent. It is a fact which can be easily authenticated that the Indians in mass prefer to deal entirely with military commanders, and would unanimously vote for the transfer of the Indian department to the War Department. In this they are mainly influenced by the knowledge that they can rely upon what the military commander tells or promises them, as they see he has power to fulfil his promise.

2. The first and great interest of the army officer is to preserve peace with the Indians. His home during his life is to be at some military post in the Indian country, and, aside from the obligations of duty, his own comfort and quiet, and the possibility of escaping arduous and harassing field service against Indians at all seasons of the year, accompanied by frequent changes of station, which render it impossible for him to have his family with him, render a state of peace with Indians the most desirable of all things to him. He therefore omits no proper precautions, and does not fail to use all proper means, by just treatment, honest distribution of annuities, and fair dealing, to secure quiet and friendly relations with the Indian tribes in his neighborhood. His honest distribution of the annuities appropriated to the Indians is further secured by his life commission in the army, and the odium which would blast his life and character by any dishonest act. If dismissed from the service for such malfeasance, he would be publicly branded by his own profession, and would be powerless to attribute his removal from office to any but the true cause. The Indian agent, on the other hand, accepts his office for a limited time and for a specific purpose, and he finds it easy when he has secured his ends (the rapid acquisition of money) to account for his removal from office on political grounds,

or the personal enmity of some other official of his department superior in rank to himself. The eagerness to secure an appointment as Indian agent, on a small salary, manifested by many persons of superior ability ought of itself to be a warning to Congress as to the objects sought by it. It is a common saying in the west that next to, if not indeed before, the consulship to Liverpool, an Indian agency is the most desirable office in the gift of the government. Of course the more treaties an Indian agent can negotiate the larger the appropriations of money and goods which pass through his hands and the more valuable his office. An Indian war every other day, with treaty making on intermediate days, would be, therefore, the condition of affairs most satisfactory to such Indian agents. I by no means mean to say that all Indian agents are dishonest. In truth I know some who are very sincere and honorable men, who try to administer their offices with fidelity to the government, but that the mass of Indian agents on the frontier are true only to their personal and pecuniary interests, I am very sure no one familiar with the subject will dispute.

I repeat, then, that a condition of peace with Indians is above all things desirable to the military officer stationed in their country; something very like the reverse to the Indian agent.

3. The transfer of the Indian bureau to the War Department would at once eliminate from our Indian system the formidable army of Indian superintendents, agents, sub-agents, special agents, jobbers, contractors, and hangers-on who now infest the frontier States and Territories, and save to the government annually a sum of money which I will not venture to estimate. The army officers detailed to perform duty in their places would receive no compensation in addition to their army pay. Previous to the creation of the Interior Department and the transfer of the Indian bureau to that department, army officers performed well and honestly the duties of Indian agents, and it is only necessary to refer to our past history to demonstrate that our relations at that time with the Indians were far more friendly and satisfactory than they have been since.

In conclusion, it is hardly necessary to repeat that no business was ever successfully conducted where there was a joint jurisdiction and a divided responsibility; nor can harmony under such circumstances ever be looked for, so long as human nature remains what it is. The military are absolutely necessary in the Indian country to protect the lives and property of our citizens. Indian agents and superintendents are not necessary, since their duties have been and can still be faithfully and efficiently performed by the army officers stationed with the troops. Harmonious and concerted action can never be secured while both parties are retained.

The military are necessary, the civil officers are not, and, as it is essential that the one or the other be displaced, I cannot see what doubt can exist as to which party must give way.

These are only the general reasons for the retransfer of the Indian bureau to the War Department, reasons which are well understood by every one familiar with the subject. Many others equally valid and much more in detail might be given, but perhaps those already set forth, and which command the general concurrence of everybody concerned, would seem to be sufficient.

Concerning the general policy to be pursued toward the Indian tribes, their restriction to reservations, the locations of such reservations and their management, together with the regulation of trade with them, I have so fully set forth my views in various communications to the Secretary of War and to yourself, which have from time to time been published by Congress, that I do not deem it necessary to repeat them here. In order that any policy whatever may be consistently and efficiently pursued, a change in our present administration of Indian affairs is absolutely essential. The retransfer of the Indian bureau to the War Department is believed to be the first step toward a reformation, and until that

step is taken it is useless to expect any improvement in the present condition of our Indian relations.

A reference to my communications on this subject for the past twelve months will exhibit the fact that I have repeatedly warned the government that the Indian war now upon us was inevitable, and that no reliance whatever could be placed upon treaties of peace such as had been negotiated. The peace commissioners promise the Indian, in the first place, that the whites shall not go into the Indian country, knowing well that it is impossible to fulfil such a promise. This is the first and most persistent demand of the Indian, a demand readily conceded but never executed. Other provisions are inserted in the treaty equally certain to remain unfulfilled. The Indian has lost all confidence in such promises, and only makes a treaty to secure the money and supplies which accompany it. In this unscrupulous manner treaties are made and violated on both sides, and in this manner they will continue to be made unless some change in our Indian system is effected.

While the policy of the government toward the Indian tribes is humane and liberal, so far as legal enactments are concerned, the mode of administering that policy has not only frustrated all the kind and benevolent intentions of the government, but has absolutely worked wrong and injustice, both to whites and Indians, which could not have occurred had there been no laws whatever on the subject.

I am, general, respectfully, your obedient servant,

JOHN POPE,

Brevet Major General U. S. A.

General U. S. GRANT,

General-in-Chief, Washington, D. C.

Official :

E. S. PARKER,

Colonel and A. D. C.

Respectfully forwarded to the Secretary of War, with request that these copies be sent to the Military Committees of the United States Senate and House of Representatives, and the Hon. Secretary of the Interior.

U. S. GRANT, *General.*

HEADQUARTERS ARMY, *January 27, 1867.*

RESOLUTIONS
OF THE
COMMON COUNCIL OF BALTIMORE.

JANUARY 31, 1867.—Ordered to be printed, and referred to the Committee on the Judiciary.

CHAMBER, FIRST BRANCH CITY COUNCIL,
Baltimore, Md., January 26, 1867.

SIR: Herewith please find true copy of "preamble and resolutions" adopted by both branches of the city council of Baltimore on the day of the above date.

By order:

Respectfully,

GEO. W. BROOKS,
Clerk First Branch

HON. SPEAKER of *House of Representatives, Washington city.*

Whereas it appears from the debates in Congress regarding the resolution of inquiry into the recent Maryland elections, that the honorable Charles E. Phelps, representative from the third district, took it upon himself to assert that the proposed inquiry was not in accordance with the wishes of any great number of the Union men of Maryland—

Be it resolved by the mayor and city council of Baltimore, That the honorable Charles E. Phelps has no authority to speak for the Union men of Baltimore, as his political connections are such as to prevent him from either knowing or representing their wishes.

Resolved, That the thanks of the loyal people of Baltimore be, and they are hereby, tendered to the honorable Hamilton Ward for pressing his resolution of inquiry to a passage, and to the House of Representatives for the interest manifested in their affairs by its adoption.

Resolved, That the exigencies of the times demand that the late rebellionists and present revolutionists of Maryland, who have acquired power through the treachery of Governor Swan, under the encouragement of President Johnson, should be prevented by the United States from consummating their revolutionary projects, which are fraught with danger to the State and to the country.

Resolved, That, in the measure inaugurated, and in part acted upon, by the legislature of Maryland, the corrupt bargaining away the of rights of the people for a seat in the United States Senate; the unprecedented outrage upon the municipality of Baltimore, by an act attempting to set aside certain provisions of its charter; the projected enfranchisement law, and the bill to call a new constitutional convention, assuming, unconstitutionally, to anticipate the time fixed by the organic law, and to alter the basis of representation, together with other violent and proscriptive measures, we recognize the revolutionary and re-

bellious spirit which animated the same parties in 1861, and we believe it to be part of another organized southern movement detrimental to the Union, and calculated to prevent any peaceful adjustment of the pending national difficulties.

Resolved, That as the Constitution of the United States guarantees to every State a republican form of government, and the legislators from the western shore of Maryland, in public debate on the floor of the senate, have construed the guarantee clause to mean *protection of the people of any State from any revolution of their form of government by the officers thereof*, the people of Baltimore and the State of Maryland are entitled to such protection from the revolutionary purposes of the governor and legislature of Maryland.

Resolved, That a copy of these resolutions be forwarded to the Hon. Hamilton Ward and the Hon. Speaker of the House of Representatives, at Washington, and also to Hon. J. A. J. Creswell, Hon. John L. Thomas, jr., and Hon. Francis Thomas.

RECONSTRUCTION IN VIRGINIA.

MEMORIAL

OF

UNION CITIZENS OF NORFOLK, PORTSMOUTH, AND
EASTERN VIRGINIA,

PRAYING

That Congress will give to Virginia a government based upon republican principles and tried loyalty.

JANUARY 31, 1867.—Referred to the Committee on Reconstruction and ordered to be printed.

To the honorable the Congress of the United States, at Washington assembled:

We, the undersigned Union men of Norfolk, Portsmouth, and Eastern Virginia, feeling ourselves aggrieved, our political and social rights in peril, our property and material rights in jeopardy, and, relying with firm confidence upon the probity, justice, patriotism, and sense of right manifested by your honorable body as the representative power of the loyal, law-abiding people of the United States, we beg leave to lay before your honorable body our wrongs and grievances, their causes, and our earnest petition.

We feel ourselves aggrieved because we have been robbed and are destitute of a republican form of government, such as of right belongs to the Union men of Virginia, who have proved their loyalty to their State, the United States, and the cause of republican liberty through the dark days of secession, treason, and armed rebellion.

We feel ourselves aggrieved because the power of the federal government, since the suppression of the rebellion, has been withdrawn to the extent necessary to render past treason a present virtue, and the late unholy rebellion an honorable cause, from which the present social and political organizations of the State *professedly* draw their grades of respectability.

We feel ourselves aggrieved because, since the withdrawal of the protecting power of the United States, the, to us, great question of legitimacy, in all its political, social, and material bearings, as pertaining to the wants and necessities of men and their chosen government, has been decided against us, and in favor of those who for four long years waged their war of hate and blood against us, our lives, our fortunes, our liberty, and our government.

We feel ourselves aggrieved because they brand us as traitors to their "lost cause," while we are forced to bear the, to them, disgrace thus heaped upon us; because they occupy both houses of our State legislature, and make laws for us,

instead of *our* making laws for them! Because they occupy our courts as judges, magistrates, and jurors, and dispense *their* justice to us—a justice which, in its impure absolutism and envenomed application to the Union men of Virginia, amounts to TREASON sitting in judgment over LOYALTY! Because, upheld by their own legislative and judicial power, together with the almost entire press of Virginia, they have established their past treason as a mark of legitimate honor from which all political and social preferment must arise, whilst loyalty to the federal government is made a political and social crime, branded with the bitter hate conveyed in the terms “Yankee,” or the more detested people classed as “the mean white trash of the south.” Because legitimacy has been established by their power, based upon the honor which clusters around the history of their bloody treason. Because treason has thus been made honorable and loyalty “odious.” Because we are crushed into the silence of secret gatherings! Because the use of court-houses and places for public meetings have been denied us by the powers that be. Because freedmen are denied the, to them, glorious privilege of celebrating the anniversary of their emancipation! Because we are denied or robbed of freedom of speech, freedom of action, and those liberties which are justly derived from self-government! Because we are denied the impartial justice which should belong to courts, civil tribunals, and civilized society, either to ourselves or the more unfortunate freedmen!

We shall not plead our own entire innocence or want of error in relation to this sad state of affairs; but beg leave to lay before your honorable body the history of our actions, by way of refreshing your memory, asking nothing in return but honorable sympathy, and the rendering of a just judgment upon the part of Congress and the loyal masses of our common country.

At the close of the war in 1865 our position was that of national, political, and social grandeur. Victory had perched upon the banners of our country, and we felt that strong self-reliance natural to people whose government, by the most terrible of all arguments, had proved before the civilized world the strength of its power and dignity. We felt, we believe justly, proud of our position as Union men of Virginia, and with hearts overflowing with gratitude to God and the loyal hosts of the Union for the deliverance of our country from the hitherto common death of republics, we felt kindly towards our fallen foes. We looked upon them as our erring, unfortunate brethern, who, as was the fact, came back to us clothed not only with the disgrace of defeat in a bad cause, but with the crime of an unholy war and treason against both State and federal governments, to the laws and penalties of which they are amenable. Feeling for them, situated as they were in this deplorable condition, a sympathy common to humanity, the Union men of Virginia met on the corners of streets, in public as well as private places, to discuss the propriety of relieving them from the odium of crime; of snatching them from the altar of their self-immolation, self-political and social ostracism, and clothing them anew in the habiliments of republican liberty and equal citizenship with ourselves.

The Union men of Virginia, with comparatively few exceptions, believed this the best policy to pursue. It was agreed that the grand magnanimity of such an act upon the part of the Union men would, without the least possible doubt, win the confidence and respect of the late insurgents.

It is enough to remind your honorable body that, immediately after the recognition of Governor Peirpoint as the executive of Virginia by the President, in his order of May 9, 1865, steps were taken to carry out this magnanimous policy. The governor called the Alexandria legislature together, June 19. On the 20th a bill was passed prescribing means whereby persons disfranchised by the third article of the Alexandria constitution might be restored to the rights of voters. On the 21st a bill was passed submitting to a vote of the people whether the next legislature should have the power to amend the third article of said constitution. The election was held in October, and the

vote was almost unanimous in favor of the amendment. The legislature met in December; the constitution was amended, and the last finishing stroke, so far as the Union men were concerned, was given to an act which for its magnanimity stands to-day upon the page of history with scarcely one, if any, parallel. We believe that beside it stands an ingratitude upon the part of the late insurgents, exemplified by legislative and judicial acts, by political and social persecutions, by the envenomed hatred vomited forth by their rebellious press, which will remain forever upon the page of history, destitute of a parallel, and as a witness against the honor, integrity, and political morality of the secessionists of Virginia.

Your honorable body, from this statement of facts, will perceive that our error has been that of magnanimity, and their crime that of unparalleled, base ingratitude. Such are the facts in connection with the causes of our present grievances, and since it is a fact that the magnanimity which has marked our almost every act has been met with persecutions, political and social ostracism, we are forced by these lamentable circumstances to conclude that endurance has ceased to be a virtue. To refuse to use such means as are within our reach to make loyalty honorable and treason odious in all time to come; to preserve our own and the liberties of posterity inviolate, within the bounds of our commonwealth, would, in our humble opinion, be an act of treason in itself, a cowardice which belongs alone to slaves, and a lasting disgrace to ourselves and posterity.

The only means within our reach is an appeal to your honorable body, the Congress of the United States. Knowing that, by the providence of an All-wise God and the wisdom of Congress, the present so-called government of Virginia and its constitution have not been recognized by the law-making power of the United States—knowing that the work of reconstruction has been placed in your hands by the Constitution and the suffrages of the loyal millions of the United States—we still have strong hopes for the future. Believing that the great object to be attained is respect and reverence for the Constitution and laws of our common country, and having been taught by the history of the past and our present condition that there is but one way by which this great object can be attained, we, in view of these facts and these teachings, humbly and earnestly petition your honorable body to exert the power which is vested in Congress by the Constitution in giving to the people of Virginia a government which, in all its legislative and judicial branches, can be respected for its loyalty and justice to Union men. In short, we petition your honorable body to remove the present government of Virginia, because of its illegitimacy and well-known disloyalty, and, in its stead, give us a government with none but loyalists as voters and administrators of law and justice.

We beg leave to impress upon your minds, in this our petition, the absolute necessity of such action upon the part of Congress as will give respectability to the cause of humanity, justice, and loyalty in Virginia. It must be readily perceived by your honorable body, from the facts which we herewith lay before you, that unless we can have our social and political problem as unionists guarded by local, magisterial, judicial, and legislative power, loyalty to the general government will remain, as at present, a work of dishonor, against which legislators, jurors, and judges, as well as a degenerate press, can hurl their shafts of hatred, in the shape of bad laws, unjust judicial decisions, and public scorn, with impunity. The teachings of the history of all nations goes to prove that no people, unprotected by power, can long withstand the terrible pressure thus brought to bear upon them. The weak will readily become victims to a principle which, in all its material, social, and political operations, proves unionism a folly and Mason and Dixon's line a wall of eternal hatred, which the weak humanity of Union men has thus far tended to perpetuate; while, on the other hand, the strong, given up to social and political persecutions and to despair, will of necessity become hermits among men—a doom

more to be dreaded than the Dry Tortugas—or have to emigrate to a more congenial clime.

Feeling as we do, as Union men of Virginia, the crushing weight of this terrible social and political problem resting upon us with all its force, and having endured the opprobrium and persecutions heaped upon loyalty, we feel ourselves justified in pleading our cause and that of the Union with more than common zeal and earnestness. With us it is more than life! It is respectability for ourselves and children! It is liberty applied in its most comprehensive meaning to the down-trodden masses of Virginia! And in the name of these; in the name of liberty, the heritage left us by our fathers, and lately wrested from the hands of traitors; in the name of down-trodden loyalty and outraged humanity; in the name of that Union for which so much precious blood has been spilled and treasure expended, we earnestly petition your honorable body, the Congress of the United States, to interpose, and give to Virginia a government based upon republican principles and tried loyalty.

William R. Jones, merchant.	H. C. Brown, mechanic.
Charles N. Buttz, attorney at-law.	Dr. James E. Bell.
P. H. Whitehurst, merchant.	F. G. Story.
E. F. Preston, editor.	C. H. Whitehurst, merchant.
J. T. Daniels, merchant.	Alonzo L. Sanborn.
P. Dilworth, merchant.	G. P. Kneller.
S. H. Brodsall.	J. P. Hodges, deputy clerk United States court.
W. H. Lockwood.	N. Piggott, clerk in navy yard.
William R. Carpenter.	John B. Stevens.
Robert Goodson.	Thomas Haris.
W. H. Harding.	James Norcom, formerly mayor of Edenton, N. C.
G. H. Banan.	Peter Appenzeller.
James Baily.	John Appenzeller.
Henry Brenden.	George W. Wright.
James H. Hall.	Stevenson T. Hannah.
W. H. Barry, clerk United States district and circuit court.	Jacob S. Smithers.
W. T. Bell, commissioner of revenue.	O. E. Johnson.
Z. Sykes, late justice of the peace.	E. T. Jackson.
J. W. Smith, late major United States army.	H. E. Havey.
Isaac L. Purnell.	Henry Meekens.
J. Holden Foster.	Samuel R. Mann.
John T. Dunbar, assistant United States inspector.	George T. Vanscoton.
William Brown, mechanic.	William Walton.
Peter O. Butt.	Harrison Sneed.
S. E. Armstrong.	Robert Bray, late of co. I, 11th Pennsylvania cavalry.
John Lancraft.	George W. Munson.
Walter W. Henderson.	James N. Croft
Henry A. Tuttle.	Thomas S. Collier, deputy United States marshal.
Charles E. Jackson.	J. C. Jones.
Thomas Peachey.	Charles K. Floyd.
C. M. Flint.	Francis DeCordy.
L. Joshua N. Flint.	Robert Ballance.
George C. Johnson, late 1st lieutenant United States volunteers.	O. P. Harman, late major United States army.
Peter Q. Shriver, late 1st sergeant 11th Pennsylvania volunteer cavalry.	Isaac S. Jenkins.

Henry H. Hopler, late private United States army.	Willard Johnson, late major United States cavalry.
William H. Brooks, sr.	John Wilson.
G. M. Dawley.	William Mackey.
William Turner.	Peter Shepherd, sr.
Jacob Bornio.	John Fitchett.
Joseph Mackey.	Samuel Jones.
William H. Dayley.	Ralph Williams.
Arthur Barney.	Abraham Happer.
Johnson Forman.	Robert Bell.
Thomas Johnson.	Peter Moore.
Francis Jones.	Henry Pierce.
Frederick W. Wams.	Robert Pierce.
Joseph Jones.	Christopher Pierce.
William Parker.	Henry Hall, sr.
Moses Williams.	Owen Bright.
Thomas Parker.	Denby Lovett.
William Fooks.	John Baker.
Plumas Fuller.	Alexander Atkins.
John Givings.	Louis Burnum.
Daniel Butt.	Thomas Wright.
George Walker.	Harrison Butt.
Isaiah Wright.	Frank Hendly.
William Tabb.	Francis King.
Edward Walk.	Laister Robinson.
William Forman.	James Grant.
Edward Godfrey.	George Walker.
Willis Bowzer.	John Walker.
John Taylor.	William H. Houston.
Henry Birt.	Albert Portlock.
James Dawley.	William Lewis.
Peter James.	William Godfrey.
Moses Taylor.	Jasper Cormick.
Daniel Whitehurst.	John Gibbs.
David Barnes.	Smallwood Ackes.
Edward Barney.	Jersy Butt.
Antony White.	Steven Elliott.
Samuel Johnson.	Jacob Warren.
Isham Cowling.	Allen Smith.
Daniel Malbron.	Edward Butt.
Granison Randolph.	Alfred Baker.
Solomon Bright.	Thomas Watkins.
James Smith.	Peter White.
Dolly Corprew.	James Outan.
J. H. Jordan.	Severn Williams.
Richard Thirgood.	David Williams.
Sandy Brooks.	Mathew Gilcrease.
Jubeter Ward.	John Long.
John Willowby.	Thomas Keeling.
Alexander Miller.	Rebby West.
Henry West.	Darius T. Smith.
Peter Lindsay.	Thomas H. Sneed.
Robert Jones.	Theodore Hopkins.
Mathias Williams.	Jackson Quick.
Evans Mathews.	O. E. Moore.
Henry Bright.	John P. Stone.

Maurice Painter.
 William Swain.
 George Sparrow.
 Willoughby William.
 David Jones.
 Henry Manning.
 Joseph Harvy.
 Dennis Bains.
 James Culvert.
 Henry Nash.
 Joseph Nash.
 Harry Nash.
 Willis Nash.
 Caleb Ashley.
 Moses Pain.
 Walter May.
 Henry May.
 David Jones.
 Henry Painter.
 William Jones.
 Harry Cone.
 David Cone.
 C. P. Williams.
 M. Campe.
 T. Sharp.
 Patrick O'Brien.
 J. Wallace.
 G. M. Wallace.
 Elbridge Hunter.
 M. Singleton.
 M. O. Marshall.
 Taylor Hazleton.
 S. P. Terry.
 William McMahon.
 Terrance Magruder.
 Peter Gallagher.
 N. Morrison.
 O. Flaherty.
 M. Hawthorne.
 David Dobson.
 Newton T. Cosson.
 Wilson Cosson.
 William Sampson.
 Andrew Gabert.
 John Mooris.
 Jacob Long.
 D. D. Fernber.
 E. E. Manning.
 Thomas Fullerton.
 Henry Fersche.
 L. L. Sanders.
 Ashley Sarry.
 T. T. Reddick.
 John McLellen.
 Thomas McCoy.
 P. S. Pollard.

S. G. Daniels.
 A. L. Greene.
 S. H. Wandell.
 John Mackay.
 C. Cherry.
 David Sithurn.
 Albert Grey.
 A. Hawthorn.
 B. Fitzhugh.
 T. Harrington.
 P. Davis.
 H. Snead.
 W. H. Burghardt.
 Elon Phillips.
 S. S. Hubbard.
 G. H. Tazewell.
 George Munsell.
 H. Clark.
 O. N. Osborn.
 Anson Knowls.
 Farmer Tazewell.
 J. N. Mitchell.
 D. D. Johnston.
 Arthur Jones.
 Egbert Holliday.
 W. Newton.
 Harmon Ostrander.
 James Conrad.
 D. Dudley.
 W. W. Hinchman.
 Richard Kelly.
 Patrick Kelly.
 T. T. Horan.
 James Jamison.
 George Horan.
 Michael Welch.
 J. Lynch.
 T. Lynch.
 Oscar Danils.
 Edward Marshall.
 E. F. Farnsworth.
 Mathew P. Mallory.
 T. H. Jones.
 Jacob Williamson.
 W. E. Williams.
 O. H. Mays.
 Nelson T. Pollard.
 Simon C Coness.
 D. E. Denney.
 H. D. Hunter.
 Lewis Armstrong.
 C. H. Harrold.
 Felix E. Winston.
 R. W. Hughes.
 D. D. Hopps.
 Moses Conway.

RECONSTRUCTION IN VIRGINIA.

Nathan T. Tharson.
 P. R. Parker.
 C. C. King.
 Andrew Moorehead.
 S. S. Beard.
 S. C. Webb.
 Cornelius W. Watson.
 J. J. Porter.
 M. E. Good.
 T. T. Gibbin.
 G. N. Allen.
 A. G. Wellington.
 A. Johnson.
 M. Madery.
 B. Franklin.
 George Amos.
 Charles Silliman.
 Anthony Massey.
 S. S. Barnes.
 F. Short.
 B. Chesman.
 G. H. Garrison.
 L. L. Robinson.
 A. Jefferson.
 H. W. Brickhouse.
 Z. Asp.
 G. Williams.
 W. Barnes.
 B. Williams.
 Henry Johnston.
 F. F. Brock.
 C. C. Elliott.
 J. J. Ellis.
 Harrison Clap.
 J. J. Brooks.
 Thomas Cole.
 A. Bernice.
 B. Albert.
 N. C. Willis.
 W. Williams.
 F. F. Warren.
 R. Parker.
 T. D. Thompson.
 W. G. Wilson.
 H. W. Himes.
 Thomas Nicholson.
 Thomas L. Langly.
 William W. Wright.
 N. J. Ives.
 S. D. Sparrow.
 J. C. Corporal.
 William W. Stephens.
 Lewis Williams.
 A. A. Fuller.
 J. E. Manning.
 William W. Smith.

J. S. Kinney.
 Gordon Vass.
 Sampson Shipman.
 Martin Hanover.
 Peter P. Boyer.
 Joseph K. Pearce.
 E. W. Daniels.
 J. M. Miller.
 P. D. David.
 Cornelius Webber.
 J. Armstead.
 P. Washington.
 L. White.
 M. Treagle.
 J. Robinson.
 E. Reddick.
 C. C. Michael.
 M. Colden.
 J. Woodis.
 T. Smith.
 W. W. Richards.
 William Wright.
 J. Corprew.
 M. Hardee.
 F. Wright.
 E. E. Terris.
 D. Edwards.
 D. D. Butt.
 H. H. Bond.
 P. Brightman.
 D. D. Wyatt.
 T. T. Thomas.
 M. M. Myers.
 M. Johnson.
 Henry Nonell.
 W. W. Coburn.
 M. Gardiner.
 Wilson Murden.
 P. Richmond.
 H. S. Sessions.
 John Corpierson.
 W. W. Walk.
 Joseph K. Reddick.
 J. Jeremiah.
 Asa Kight.
 William Kight.
 Hezekiah Burgess.
 Enoch Gordon.
 William S. Smith.
 E. W. Washington.
 Moses E. Grimes.
 H. J. Hill.
 Isaac D. Dean.
 Isaac S. Sumner.
 G. W. Robinson.
 Esop Outlaw.

J. J. Miller.
J. L. Spruel.
H. H. Walley.
Hugh Isaacs.
John Williamson.
J. J. Williams.
Miles E. Thornton.
M. M. Murden.
Redmond Parker.
A. A. Moor.
M. M. Warren.
J. H. Griffin.
Sandy Beardsley.
J. S. Gilchrist.
J. Brickhouse.
L. Davis.
F. Spencer.
U. Hopkins.
D. Sackett.
Henry Sheppard.
K. Christan.
Nelson Hoffer.
B. Jackson.
James Whitus.
T. Williams.
S. Simmons.

Johnston Outlaw.
Isaac Lamb.
Frank Hubbard.
John Bessey.
Andrew Anderson.
W. W. Ames.
Miles Smithson.
W. M. Smith.
R. A. Sanger.
Ezra Griffin.
J. J. Wilson.
James Wilson.
M. Humphry.
H. H. Marcy.
E. Whitouse.
M. McKay.
E. C. Whitouse.
J. Williams.
J. Walk.
B. Coleman.
N. Green.
B. Crompt.
Vandever Henderson.
John Henry Webb.
Alexandria Smith.
Marcus Bowne.

INDIAN AFFAIRS.

LETTER

FROM

THE SECRETARY OF WAR,

DIRECTED TO

The chairman of the Committee on Military Affairs, transmitting a communication from General Grant on Indian affairs.

FEBRUARY 2, 1867.—Referred to the Committee on Indian Affairs and ordered to be printed.

WAR DEPARTMENT,
Washington City, February 1, 1867.

SIR: I have the honor to transmit herewith, for the consideration of the committee, a copy of a communication on Indian affairs received this day from General Grant.

Very respectfully, sir, your obedient servant,

EDWIN M. STANTON,
Secretary of War

Hon. R. C. SCHENCK,
Chairman of the Military Committee, House of Representatives.

HEADQUARTERS ARMIES OF THE UNITED STATES,
Washington, D. C., February 1, 1867.

SIR: The enclosed papers, just received from General Sherman, are respectfully forwarded and your special attention invited. They show the urgent necessity for an immediate transfer of the Indian bureau to the War Department and the abolition of the civil Indian agents and licensed traders. If the present practice is to be continued, I do not see that any course is left open to us but to withdraw our troops to the settlements and call upon Congress to provide means and troops to carry on formidable hostilities against the Indians until all the Indians or all the whites on the great plains and between the settlements on the Missouri and the Pacific slope are exterminated.

The course General Sherman has pursued in this matter, in disregarding the permits of Mr. Bogy and others, is just right. I will instruct him to enforce his order until it is countermanded by the President or yourself.

I would also respectfully ask that this matter be placed before the President and his disapproval of licensing the sale of arms to Indians asked.

We have treaties with all tribes of Indians from time to time. If the rule is to be followed that all tribes with which we have treaties and pay annuities can procure such articles without stint or limit, it will not be long before the matter becomes perfectly understood by the Indians and they avail themselves of it to equip perfectly for war. They will get the arms either by making treaties themselves or through tribes who have such treaties.

I would respectfully recommend that copies of the enclosed communications be furnished to the military committee of each house of Congress.

Very respectfully, your obedient servant,

U. S. GRANT, *General.*

Hon. E. M. STANTON, *Secretary of War.*

HEADQUARTERS MILITARY DIVISION OF THE MISSOURI,
St. Louis, Missouri, January 26, 1867.

GENERAL: I have this moment received your letter of January 22, about the sale of arms and ammunition to Indians by traders and agents.

We, the military, are held responsible for the peace of the frontier, and it is an absurdity to attempt it if Indian agents and traders can legalize and encourage so dangerous a traffic. I regard the paper enclosed, addressed to Mr. D. A. Butterfield and signed by Charles Boggy, W. R. Irwin, J. H. Leavenworth, and others, as an outrage upon our rights and supervision of the matter, and I now authorize you to disregard that paper and at once stop the practice, keeping the issues and sales of arms and ammunition under the rigid control and supervision of the commanding officers of the posts and districts near which the Indians are. If the Indian agents may, without limit, supply the Indians with arms, I would not expose our troops and trains to them at all, but would withdraw our soldiers, who already have a herculean task on their hands.

This order is made for this immediate time, but I will, with all expedition, send these papers, with a copy of this, to General Grant, in the hope he will lay it before the President, who alone can control both the War and Indian Departments, under whom, at present, this mixed control of the Indian question now rests in law and practice.

Your obedient servant,

W. T. SHERMAN,
Lieutenant General Commanding.

General W. S. HANCOCK,
*Commanding Department of the Missouri,
Fort Leavenworth, Kansas.*

FORT ZARAH, KANSAS, *November 15, 1866.*

SIR: You having requested verbally to be informed in regard to your right to sell arms and ammunition to Indians, we have to state as follows: You, as an Indian trader, licensed for that purpose by the United States government, are authorized to trade or sell arms and ammunition to any Indians that are at peace with, and receiving annuities from, the United States government.

This rule, of course, applies to any other regularly licensed Indian traders, as well as yourself.

CHAS. BOGY,
W. R. IRWIN,
Special United States Indian Agents.
J. H. LEAVENWORTH,
*Agent for Kiowas and Comanche Indians
of the Upper Arkansas.*
WM. H. BENT,
E. W. WYNKOOP,
U. S. Indian Agents, Upper Arkansas Agency.

A true copy:

HENRY ASBURY,
Capt. 3d U. S. Infantry, Bvt. Maj. U. S. A., Com'd'g.
Mr. D. A. BUTTERFIELD, *Present.*

ISSUE OF ARMS TO INDIANS.

LETTER
FROM
THE SECRETARY OF WAR,

ADDRESSED TO

The chairman of the Committee on Military Affairs, relative to the issue of a large number of arms to the Kiowas and other Indians.

FEBRUARY 2, 1867.—Referred to the Committee on Indian Affairs and ordered to be printed.

WAR DEPARTMENT,
Washington City, February 1, 1867.

SIR: I transmit herewith, for the information of the Military Committee, a communication from Major H. Douglas, 3d infantry, commanding at Fort Dodge, Kansas, dated January 13, 1867, in relation to the issue of large numbers of arms, with ammunition, to the Kiowas and other Indians, and expressing his apprehension of serious Indian hostilities in consequence thereof.

I am, sir, very respectfully, your obedient servant,

EDWIN M. STANTON,
Secretary of War.

Hon. R. C. SCHENCK,
Chairman Military Committee.

FORT DODGE, KANSAS,
January 13, 1867.

GENERAL: I consider it my duty to report what I have observed with reference to Indian affairs in this country, so that such representations may be made to the Department of the Interior by the commanding general of division as he may think proper, also other items of information which may be useful.

The issue and sale of arms and ammunition—such as breech-loading carbines and revolvers, powder and lead, (loose and in cartridges,) and percussion caps—continues without intermission. The issue of revolvers and ammunition is made by Indian agents, as being authorized by the Commissioner of Indian Affairs, and the sale of them in the greatest abundance is made by traders. Butterfield, an Indian trader, formerly of the overland express, has the largest investment in Indian goods of all the traders. He has sold several cases of

arms to the Cheyennes and Arapahoes. Charley Rath, a trader, who lives at Zarah, has armed several bands of Kiowas with revolvers, and has completely overstocked them with powder.

Between the authorized issue of agents and the sales of the traders, the Indians were never better armed than at the present time. Several hundred Indians have visited this post, all of whom had revolvers in their possession. A large majority had two revolvers, and many of them three.

The Indians openly boast that they have plenty of arms and ammunition in case of trouble in the spring.

The Interior Department does not seem to appreciate the danger of thus arming those Indians. The evil of presenting a revolver to each of the chiefs of bands would hardly be appreciable, but when the whole rank and file are thus armed, it not only gives them greater courage to murder and plunder, but renders them formidable enemies.

The agents have no real control over the traders; in fact, they are accused by many, both Indians and white men, of being in league with them, and of drawing a large profit from the trade. Should such be the case, (and I think it highly probable,) it is a natural consequence that the agent does not wish to control the trader.

The anxiety of Indians at the present time to obtain arms and ammunition is a great temptation to the trader. For a revolver an Indian will give ten, even twenty times its value, in horses and furs; powder and lead are sold to them at almost the same rate, and as the bulk is small, large quantities can be transported at comparatively little expense. This anxiety cannot be caused by a lack of such articles, because they have plenty to last for some time, but everything tends to show that the Indians are laying in large supplies, preparatory to an outbreak. When the outbreak occurs, we will see too late that we have provided our enemies with the means for our destruction.

A great deal of dissatisfaction seems to have been created among the Indians by the unequal distribution of presents.

The Kiowas complain bitterly of Colonel Leavenworth, their agent, stationed at Fort Zarah. Kicking Bird, a chief of the Kiowas, states that only a few small bands of Kiowas got any presents, the balance last year got nothing; that it had been represented to Colonel Leavenworth that most of the bands were bad in their hearts, and would not go in to get their presents; that he, Kicking Bird, sent runners to tell Colonel Leavenworth that his stock was poor and he could not move in there, but he would in the spring, if the agent would keep his share of the goods, but Colonel Leavenworth would not listen, and either gave all the goods to the bands then in, or sold them to other Indians, and told them they would get no goods that year.

How much of this is true I know not, but from all I can learn there seems to be at least some foundation for the story. Bad management, bad faith, and injustice are sure to produce the worst results. Kicking Bird says that all bad feeling in his tribe is owing to the injustice of their agent; that it required all his influence to prevent an outbreak, and he is afraid that they will commence hostilities in the spring.

The Arapahoes, Cheyennes, and a large band of Sioux, under the leadership of Big Bear, are now *en route* for the purpose of crossing the Arkansas into the Kiowa country. They move ostensibly to graze and hunt buffalo. A portion of the Arapahoes, under the general leadership of Little Raven, crossed the river about four miles below this post.

The Sioux and Cheyennes are encamped about 160 miles north of this post on the Republican, and are said to be hostile. They are to cross about seven miles below here. They are all well mounted and well armed with carbines and revolvers, and supplied with plenty of ammunition.

Kicking Bird says the Sioux and Cheyennes asked his permission to cross the river, and that he refused it for fear of trouble, but that his men wish them to cross, and he believes that they will all cross the river, and that in the spring, when the grass comes up, there will be war. He had been treated kindly at Fort Dodge, or he would not tell us so, but we must look out for our lives and for our stock in the spring. He says, as they talk now all the tribes north and south of the Arkansas will be in the outbreak, his own tribe among them.

He also states that Satante, or "White Bear," a principal chief of the Kiowas, is always talking of war; that they have already had a counsel at the Kiowa camp, in which the Cheyennes, Sioux, Arapahoes, Kiowas, Comanches and Apaches were represented, and it was agreed that as soon as the grass was old enough they would *commence war*; that he (Kicking Bird) had been kindly treated at Fort Dodge, and he wished to put us on our guard; that before spring the Indians might change their minds, but at present their intention was war; he said he would be backwards and forwards frequently to give us the news.

The chief (Kicking Bird) is known to General Sherman, who talked with him last fall, and is believed at this post to be the most reliable of all the Indians.

I would respectfully state that it is my purpose to keep the district and department informed of all movements of Indians in large bodies as far as it is possible.

I am, very respectfully, your obedient servant,

H. DOUGLAS,

Major Third Infantry, Commanding Post.

ASSISTANT ADJUTANT GENERAL,

Division of Missouri.

[Indorsement.]

HEADQUARTERS DEPARTMENT OF THE MISSOURI,

Fort Leavenworth, Kansas, January 22, 1867.

Respectfully forwarded to headquarters military division of the Missouri. This communication should have been sent through the district commander, but on account of its importance I forward it at once in connection with the sale of arms to Indians, and other matters. I have furnished the district commander (Upper Kansas) with a copy of it.

WINFIELD S. HANCOCK,

Major General U. S. A., Commanding Department.

It may be well to state (although it is probably well known to the Lieutenant General) that Kicking Bird was one of the chiefs who killed Box and captured the Box family last summer, as stated to me by the elder daughter.

WINFIELD S. HANCOCK.

Major General United States Army.

HEADQUARTERS MILITARY DIVISION OF MISSOURI,

St. Louis, Missouri, January 25, 1867.

Respectfully forwarded to headquarters armies of the United States, with request that it be laid before the Committee on Indian Affairs.

I know "Kicking Bird" very well; he is intelligent, and I consider full faith can be given to his statements.

W. T. SHERMAN,

Lieutenant General Commanding.

ADJUTANT GENERAL'S OFFICE,

Washington, January 30, 1867.

Respectfully submitted to General Grant, commanding army of the United States.

E. D. TOWNSEND,

Assistant Adjutant General.

Respectfully returned, with request that this communication be laid before the Military Committees of Congress.

By command of General Grant:

E. S. BARKER,
Colonel and Aide-de-Camp.

HEADQUARTERS ARMY UNITED STATES,
January 31, 1867.

Official:

E. D. TOWNSEND,
Assistant Adjutant General

SUFFRAGE IN THE DISTRICT OF COLUMBIA.

JOINT RESOLUTIONS

OF

THE LEGISLATURE OF MICHIGAN,

COMMENDING

The action of Congress in passing a bill annulling all distinction of color in the exercise of the elective franchise in the District of Columbia.

FEBRUARY 4, 1867.—Laid on the table and ordered to be printed.

CONCURRENT RESOLUTION.

Resolved by the house of representatives, (the senate concurring,) That the action of the Congress of the United States, in promptly passing, over the President's veto, the bill annulling all distinction on account of color in the exercise of the elective franchise in the District of Columbia, merits and receives the hearty and unqualified approval of this legislature.

Resolved, (the senate concurring,) That the clerk of this house cause a copy of the foregoing resolution to be forwarded to each of the senators and representatives in Congress from this State.

N. B. JONES,

Clerk of the House of Representatives.

LANSING, January 14, 1867.

JOINT RESOLUTION
PASSED BY THE SENATE
AND HOUSE OF REPRESENTATIVES
OF THE UNITED STATES OF AMERICA
AT THE SECOND SESSION, 1867

APPROVED BY THE SENATE

JOINT RESOLUTION

THE LEGISLATURE OF MICHIGAN

1867

Resolved, That the Governor be and he is authorized to cause to be printed and distributed to the members of the Legislature a copy of the following report of the

Commissioner of the General Land Office

GOVERNMENT REPORT

Report of the Commissioner of the General Land Office, Michigan, for the year 1866. The report contains a full and complete statement of the lands owned by the State, and of the proceeds of the sale of the same. It also contains a full and complete statement of the lands owned by the United States, and of the proceeds of the sale of the same. The report is a valuable and interesting work, and is well calculated to inform the public of the condition of the lands of the State and of the United States.

Attest:
J. B. JONES,
Chief of the Bureau of Land Office.

Witness my hand and seal this 11th day of January, 1867.

B R A Z I L.

LETTER

FROM

THE SECRETARY OF STATE,

ADDRESSED

To the chairman of the Committee on Foreign Affairs, transmitting correspondence with the Brazilian Minister relative to the expression of sympathy and condolence on the occasion of the assassination of President Lincoln.

FEBRUARY 5, 1867.—Referred to the Committee on Foreign Affairs and ordered to be printed.

DEPARTMENT OF STATE,

Washington, February 1, 1867.

SIR: I transmit to you herewith a copy of a correspondence which has taken place between this department and the Brazilian minister to this country, relative to the resolution passed by the Parliament of Brazil expressive of sympathy and condolence on the occasion of the assassination of President Lincoln. That resolution is to be found among the other similar memorials received at this department, all of which were sent in to Congress some time ago. No appropriate action having as yet been taken with regard to it, permit me to suggest that a resolution be moved thanking the Parliament of Brazil for the sympathy which prompted their proceedings.

I have the honor to be, sir, your obedient servant,

WILLIAM H. SEWARD.

Hon. N. P. BANKS,

Chairman of House Committee on Foreign Relations.

NEW YORK, *June 14, 1866.*

MY DEAR SIR: I am to call your particular attention upon the contents of your note of 21st July of last year, by which this legation has been apprised that the entire correspondence of Mr. Barboza relative to and connected with the sentiments of condolence he expressed in his note of the 19th of the same month on the part of the Brazilian Parliament, and by instruction of the imperial government would be communicated to the two houses of the Congress of the United States.

The present session of Congress will be soon adjourned, and it will be agree-

able to my government and to the two branches of the legislative power of Brazil to be acquainted of the course adopted since by the Department of State, and of the acknowledgment by both houses of the correspondence referred to.

In the message and in the proceedings of the Congress I could not find any allusion to it; and as the senators and deputies in Brazil are now convened in session, and they will expect, no doubt, the answer to their manifestation, I believed it should be convenient to send, as early as possible, this deference on the part of the United States.

I am sure that my suggestion will be agreed by you; and, with this hope, I remain, sir, with the expression of my highest consideration,

Your respectfully obedient servant,

THE COUNSELLOR DE AZAMBUJA.

Hon. WILLIAM H. SEWARD, &c., &c., &c.

DEPARTMENT OF STATE,

Washington, June 16, 1866.

SIR: I have the honor to acknowledge the receipt of your note of the 14th instant, calling my attention to the communication of Mr. Barboza of the 19th of July last, expressive of the sympathy and condolence of Brazil on the occasion of the assassination of President Lincoln.

In reply, I have the honor to inform you that the papers on this subject were communicated to Congress at the commencement of this session, but as they were included with other voluminous documents connected with the foreign relations of the United States, some time may yet elapse before they will be printed.

I avail myself of this occasion to offer to you a renewed assurance of my high consideration.

WILLIAM H. SEWARD.

Counsellor JOAQUIN MARIA NASCENTES DE AZAMBUJA, &c., &c.,

Post office box 1542, New York City.

DEPARTMENT OF STATE,

Washington, July 21, 1865.

SIR: I have had the honor to receive your note of the 19th instant, in which, in obedience to the instructions received by you from the imperial government of Brazil, you communicate to me that the chambers of senators and deputies of Brazil, uniting in the manifestation of sympathy which has been caused in that empire by the loss which the American Union has sustained in the person of the illustrious President Abraham Lincoln—above all, at the atrocious manner in which his existence was terminated—have resolved to cause the unanimous expression of their sorrow to be presented to the Congress of the United States.

In reply, I have the honor to inform you that your communication has been submitted to the President of the United States, by whom I am instructed to say to you that he has been deeply impressed by this grateful manifestation on the part of the two branches of the legislative power of Brazil; that he likewise sincerely appreciates the course adopted by the imperial government, and in a special manner the sentiments expressed by his Majesty the Emperor in the same connexion; and that he will direct the entire correspondence relative thereto to be communicated to the two houses of Congress of the United States, at their session to be convened on the first Monday of December next.

I avail myself of this opportunity to offer to you, sir, renewed assurance of my very distinguished consideration.

WILLIAM H. SEWARD.

Señor IGNACIO DE AVELLAR BARBOZA DA SILVA, &c., &c.,
Washington, D. C.

BRAZILIAN LEGATION,
New York, January 9, 1867.

SIR: I have not yet received the diplomatic correspondence ordered to be addressed to Congress at the commencement of the last session, in regard to the interesting international intercourse between the United States, Brazil, and several other American powers.

As I am going to my country on leave, it should please me very much to get, as soon as possible, that correspondence, in order that I may present it to my government, at my arrival in Rio de Janeiro, together with the three first volumes handed to me recently in Washington.

I expect, in consequence of my note of 14th June last, and according to the assurances given in the reply of the State Department of the 16th of the same month, that there will be included, besides some other important documents, the papers relative to and connected with the sentiments of sympathy and condolence expressed by the Brazilian Parliament and government on the occasion of the assassination of President Lincoln.

It was understood that until those sentiments should be made known to Congress by the printed documents, they could not act upon the matter.

The time has arrived now for this action, and I think there will be no inconvenience in assuring to the imperial government that it shall be able to express to the Brazilian Parliament, in its next session, the sentiments with which has been received its deference for the United States in so momentous an event as that of 14th April, 1865.

I have the honor to be, with the highest consideration, your excellency's most obedient and humble servant.

JOAQUIN MARIA NASCENTES DE AZAMBUJA.

HON. WILLIAM H. SEWARD,
Secretary of State of the United States.

1871
The following is a list of the names of the persons who have been admitted to the office of the Secretary of the Board of Education, since the last meeting of the Board, on the 1st of January, 1871.

1. Mr. J. H. Smith
2. Mr. J. H. Smith
3. Mr. J. H. Smith
4. Mr. J. H. Smith
5. Mr. J. H. Smith
6. Mr. J. H. Smith
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92. Mr. J. H. Smith
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95. Mr. J. H. Smith
96. Mr. J. H. Smith
97. Mr. J. H. Smith
98. Mr. J. H. Smith
99. Mr. J. H. Smith
100. Mr. J. H. Smith

EQUAL POLITICAL RIGHTS.

RESOLUTION

OF THE

HOUSE OF REPRESENTATIVES OF PENNSYLVANIA,

RELATIVE TO.

States lately in rebellion, and equal political rights.

FEBRUARY 6, 1867.—Referred to the Committee on Reconstruction and ordered to be printed

IN THE HOUSE OF REPRESENTATIVES,

Tuesday, January 8, 1867.

Mr. Mann, of Potter, offered the following resolution; which was twice read, considered, and adopted, viz:

Resolved, That as all the legislative power of the national government is vested in Congress, it is the imperative duty of that body to enact such laws, and provide for the establishment of such governments, in the States lately in rebellion, as will secure to every loyal person therein full and complete protection to life, liberty, property, and the enjoyment of equal political rights, to the end that the foundation of such governments may be fixed on principles of eternal justice, which will endure for all time.

Resolved, That the clerk of this house be requested to forward a copy of the above resolution to each of the senators in Congress, and members of the House from the State.

Extract from the journal of the house of representatives of the commonwealth of Pennsylvania.

ADIN W. BENEDICT,
Clerk House of Representatives.

RESOLUTION

OF THE

HOUSE OF REPRESENTATIVES

IN SENATE

ON THE

REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE

IN THE HOUSE OF REPRESENTATIVES

ON THE

REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE

IN THE HOUSE OF REPRESENTATIVES

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ON THE

REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE

IN THE HOUSE OF REPRESENTATIVES

ON THE

REDUCTION OF TAX ON PETROLEUM.

RESOLUTIONS

OF

THE LEGISLATURE OF PENNSYLVANIA

RELATIVE TO

A reduction of the tax on petroleum.

FEBRUARY 7, 1867.—Referred to the Committee of Ways and Means and ordered to be printed.

JOINT RESOLUTIONS instructing our senators and representatives in Congress to procure a reduction of tax on petroleum.

Whereas petroleum has become one of the great staples of Pennsylvania, and of vast national importance, and, as such, deserving of encouragement, not only by the people of this commonwealth, but of the general government; and whereas this great staple, which is now recognized as a national necessity, and has become one of our most important exports, is burdened with excessive taxation, the tax on each barrel of oil (refined) amounting to eight dollars, while the price of oil (unrefined) is less than two dollars per barrel; and whereas the present enormous taxation, amounting to one hundred per centum, is not only oppressive but destructive of this great interest: Therefore,

Be it resolved by the Senate and House of Representatives of the Commonwealth of Pennsylvania in general assembly met, That our senators in Congress be instructed, and our representatives requested, to use all honorable means to procure the reduction or removal of the tax on refined petroleum.

Resolved, That the governor be, and he is hereby, requested to furnish to each senator and representative in Congress a copy of the foregoing preamble and resolutions.

JOHN P. GLASS,

Speaker of the House of Representatives.

L. W. HALL,

Speaker of the Senate.

Approved the second day of February, anno Domini one thousand eight hundred and sixty-seven.

JOHN W. GEARY.

REDUCTION OF TAX ON PETROLEUM
RESOLUTIONS
OF
THE LEGISLATURE OF PENNSYLVANIA
RELATIVE TO
A REDUCTION OF THE TAX ON PETROLEUM

Enacted May 7, 1867.—Repealed by the Committee on Ways and Means and ordered to be printed.

JOHN P. GLASS
Speaker of the House of Representatives

Whereas petroleum has become one of the great staples of Pennsylvania, and is of national importance, and as such, deserving of encouragement, not only by the people of this Commonwealth, but of the general government; and whereas this great staple, which is now recognized as a national necessity, and has become one of our most important exports, is burdened with excessive taxes, the tax on each barrel of oil (refined) amounting to eight dollars, while the price of oil (unrefined) is less than two dollars per barrel; and whereas the present excessive taxation, amounting to one hundred per centum, is not only oppressive but destructive of this great interest; Therefore, It is resolved by the Senate and House of Representatives of the Commonwealth of Pennsylvania in general assembly met, That our Senators in Congress be requested, and our representatives requested, to use all honorable means to secure the reduction or removal of the tax on refined petroleum. Resolved, That the Governor be, and he is hereby, requested to furnish to each Senator and representative in Congress a copy of the foregoing resolution and resolutions.

JOHN P. GLASS
Speaker of the House of Representatives
J. W. HALL
Speaker of the Senate
Approved the second day of February, anno Domini one thousand eight hundred and sixty-seven.
JOHN W. GEARY

CLAIMS FOR PROPERTY LOST IN NEW MEXICO.

MEMORIAL

OF THE

LEGISLATURE OF THE TERRITORY OF NEW MEXICO

FOR

Property destroyed by the rebels belonging to citizens of New Mexico.

FEBRUARY 7, 1867.—Referred to the Committee on Territories and ordered to be printed.

To the honorable the Congress of the United States :

Your memorialists, the legislative assembly of the Territory of New Mexico, would most respectfully represent that during the Texas invasion of this Territory many thousand dollars worth of property was destroyed by the rebels, and our citizens have, in response to a proclamation of the late Governor Henry Connelly, filed their claims in the office of the secretary of the Territory.

Your memorialists would most respectfully ask your honorable body to appoint a commission to settle these claims, and to make an appropriation sufficient to pay them.

And your petitioners as in duty bound will ever pray.

Resolved, That the secretary of the Territory be, and is hereby, requested to forward a copy of the foregoing to the President of the Senate and the Speaker of the House of Representatives, with a request that they will lay them before their respective Houses, and also a copy to the honorable J. Francisco Chaves, our delegate in Congress.

MIGUEL E. PINO.

President of the Council.

R. M. STEPHENS,

Speaker of the House of Representatives.

Approved January 18, 1867.

W. F. M. ARNY,

Acting Governor.

UNITED STATES OF AMERICA,

Territory of New Mexico :

I, W. F. M. Arny, secretary and acting governor of New Mexico, do hereby certify that the foregoing is a true copy of the original, which is on file in my office, as passed by the legislative assembly of the Territory of New Mexico, at its present session.

In testimony whereof I have hereunto signed my name and affixed my official seal, this 18th day of January, A. D. 1867.

[SEAL.]

W. F. M. ARNY,

Secretary and Acting Governor, New Mexico.

1990

AMENDMENT TO THE CONSTITUTION.

RESOLUTION

OF

THE LEGISLATURE OF INDIANA,

RATIFYING THE

Amendment to the Constitution of the United States.

FEBRUARY 8, 1867.—Laid on the table and ordered to be printed.

A JOINT RESOLUTION accepting and ratifying certain amendments to the Constitution of the United States proposed by Congress to the legislatures of the several States.

Whereas Congress has, by a two-thirds vote, proposed to the legislatures of the several States, as an amendment to the Constitution of the United States, which, when ratified by the legislatures of three-fourths of said States, shall be valid to all intents and purposes as a part of said Constitution, viz :

ARTICLE 14.

SECTION 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

SEC. 2. Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice-President of the United States, representatives in Congress, the executive and judicial officers of a State, or the members of the legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

SEC. 3. No person shall be a senator or representative in Congress, or elector of President and Vice-President, or hold any office, civil or military, under the United States, or under any State, who having previously taken an oath as a member of Congress, or as an officer of the United States, or as a member of

any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof; but Congress may, by a vote of two-thirds of each house, remove such disability.

SEC. 4. The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned; but neither the United States, nor any State, shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claims for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

SEC. 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article: Therefore,

Be it resolved by the general assembly of the State of Indiana, That said proposed amendments to the Constitution of the United States are hereby accepted and ratified on the part of the State of Indiana.

And be it further resolved, That the governor be authorized and requested to forward an authenticated copy of this joint resolution to the Secretary of State of the United States.

D. C. BRANHAM,

Speaker of the House of Representatives.

WILL. CUMBACK,

President of the Senate.

Approved January 29, 1867.

CONRAD BAKER,

Lieutenant Governor of Indiana, acting as Governor.

Passed senate January 18, 1867.

Passed house of representatives January 23, 1867.

STATE OF INDIANA, *Office Secretary of State, ss:*

I, Nelson Trusler, secretary of state for the State of Indiana, do hereby certify that the above and foregoing is a full, true, and complete copy of enrolled joint resolution No. 1, from which the same was taken, now on file in the office of secretary of state, for the said State of Indiana.

In testimony whereof I have hereunto set my hand and affixed the seal of the
[SEAL.] said State of Indiana, at the city of Indianapolis, this second day of
February, A. D. 1867.

NELSON TRUSLER,

Secretary of State.

BREAKWATER ON BLOCK ISLAND.

RESOLUTIONS

OF THE

LEGISLATURE OF RHODE ISLAND,

RELATIVE TO

A breakwater on Block island.

FEBRUARY 9, 1867.—Referred to the Committee on Commerce and ordered to be printed.

Whereas this general assembly, duly appreciating the exposed position of the island of Block island, and the importance to the commerce of the country at large, as well as to the commerce carried on from that island, believe that there should be a suitable harbor there for the purpose of sheltering vessels during storms and adverse winds; and believing that this desirable end may be attained at a very moderate cost in comparison to the benefits to be conferred, it is therefore—

Resolved, That the senators and representatives in Congress from this State be, and they hereby are, requested to bring this subject to the attention of the respective houses of Congress, and to use their best exertions to procure an appropriation from Congress for the purpose of building a breakwater, or of securing a safe harbor for vessels at said island.

Resolved, That the secretary of state be, and he hereby is, directed to forward a copy of the foregoing preamble and resolution to each of our senators and representatives in Congress, with a request that they would bring the same before their respective houses.

A true copy :

JOHN R. BARTLETT,
Secretary of State.

REPORT OF THE
COMMISSIONER OF THE DISTRICT OF COLUMBIA

REPORT OF THE
COMMISSIONER OF THE DISTRICT OF COLUMBIA

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REPORT OF THE
COMMISSIONER OF THE DISTRICT OF COLUMBIA

AMENDMENT TO THE CONSTITUTION.

RESOLUTION

OF

THE LEGISLATURE OF OHIO,

RELATIVE TO

A proposed amendment to the Constitution of the United States.

FEBRUARY 11, 1867.—Referred to the Committee on the Judiciary and ordered to be printed.

UNITED STATES OF AMERICA, OHIO, *Secretary of State's Office* :

I, William Henry Smith, secretary of state of the State of Ohio, do hereby certify that the annexed is a true copy of a joint resolution of the general assembly of the State of Ohio, "relative to an amendment of the Constitution of the United States," passed January 11, 1867, as taken from the original rolls on file in this office.

[SEAL.] In testimony whereof, I have hereunto subscribed my name and affixed the great seal of the State of Ohio, at Columbus, the 15th day of January, A. D. 1867.

WILLIAM HENRY SMITH,
Secretary of State.

Whereas the general assembly has received official notification of the passage by both Houses of the thirty-ninth Congress of the United States, at its first session, of the following proposition to amend the Constitution of the United States, by a constitutional majority of two-thirds thereof, in the words following, to wit :

JOINT RESOLUTION proposing an amendment to the Constitution of the United States.

Be it resolved by the Senate and House of Representatives of the United States of America in Congress assembled, (two-thirds of both houses concurring,) That the following article be proposed to the legislatures of the several States as an amendment to the Constitution of the United States, which, when ratified by three-fourths of said legislatures, shall be valid as a part of the Constitution, namely :

ARTICLE XIV.

SECTION 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States, and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States, nor shall

any State deprive any person of life, liberty, or property, without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

SEC. 2. Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice-President of the United States, representatives in Congress, the executive and judicial officers of a State, or the members of the legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

SEC. 3. No person shall be a senator or representative in Congress, or elector of President or Vice-President, or hold any office, civil or military, under the United States, or under any State, who having previously taken an oath as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may, by a vote of two-thirds of each house, remove such disability.

SEC. 4. The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

SEC. 5. The Congress shall have power to enforce by appropriate legislation the provisions of this article.

And whereas three-fourths of the legislatures of the States composing the United States are required to give assent to the said proposed amendment to the Constitution of the United States before it becomes a part thereof: Therefore—

Resolved by the general assembly of the State of Ohio, That we hereby ratify, on behalf of the State of Ohio, the above recited proposed amendment to the Constitution of the United States.

Resolved, That certified copies of the foregoing preamble and resolution be forwarded by the governor of Ohio to the President of the United States, to the presiding officer of the United States Senate, and the Speaker of the United States House of Representatives.

ED. A. PARROTT,

Speaker of the House of Representatives.

ANDREW G. MCBURNEY,

President of the Senate.

Adopted January 11, 1867.

IMPROVEMENT OF FOX RIVER.

MEMORIAL

OF THE

LEGISLATURE OF WISCONSIN,

RELATIVE TO

The improvement of the entrance of Fox river into Green bay.

FEBRUARY 11, 1867.—Referred to the Committee on Commerce and ordered to be printed.

*To the honorable the Senate and House of Representatives of the United States
of America in Congress assembled.*

The memorial of the legislature of the State of Wisconsin respectfully represents that, from the report of Major Wheeler, who was placed in charge of the appropriation made at the first session of the 39th Congress, it appears that a further sum is necessary to make a straight cut to the entrance of Fox river, such as the wants of the shipping require; and believing it to be for the interest of all parties that the work should be completed as early as possible in accordance with the report of said Major Wheeler, we earnestly pray that such further sum may be appropriated as will, with the present unexpended appropriation, complete the straight cut aforesaid, and, by so doing, greatly benefit the northeastern part of the State, and give value to much unsold land of the United States; and your memorialists will ever pray, &c.

ANGUS CAMERON,

Speaker of the Assembly.

WYMAN SPOONER,

President of the Senate.

Approved February 6, 1867.

LUCIUS FAIRCHILD,

Governor.

STATE OF WISCONSIN, *Secretary's Office, ss:*

The secretary of state of the State of Wisconsin hereby certifies that the foregoing has been compared with the original enrolled memorial on file in this office, and that the same is a true and correct copy thereof, and of the whole of such original.

In witness whereof, I have hereunto set my hand and affixed the great seal of the State, at the Capitol, in Addison, this 6th day of February, A. D. 1867.

[SEAL.]

THOS. G. ALLEN,

Secretary of State.

REPORT OF THE COMMISSIONERS OF THE LAND OFFICE
IN RESPONSE TO A RESOLUTION OF THE HOUSE OF REPRESENTATIVES
PASSED MAY 10, 1854

ALBANY: PUBLISHED BY J. B. LEECH, 1854.

REPORT OF THE COMMISSIONERS OF THE LAND OFFICE
IN RESPONSE TO A RESOLUTION OF THE HOUSE OF REPRESENTATIVES
PASSED MAY 10, 1854

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NORTHERN PACIFIC RAILWAY.

CONCURRENT RESOLUTIONS

OF

THE LEGISLATURE OF NEW YORK,

IN FAVOR OF

Granting government aid to the northern Pacific railway.

FEBRUARY 9, 1867.--Referred to the Committee on the Pacific Railroad and ordered to be printed.

EXECUTIVE DEPARTMENT,

Albany, February 9, 1867.

SIR: I have the honor to transmit a copy of concurrent resolutions passed by the legislature relative to the northern Pacific railway.

Very respectfully,

R. C. FENTON.

Whereas the State of New York, having within her borders, the commercial metropolis of the nation, is geographically situated at the foot of the great chain of inland lakes, with her eastern boundary resting upon the Atlantic ocean, and is therefore deeply interested in all questions which affect the commerce of the lakes; and whereas it is ascertained that an interoceanic communication across the continent can be established between the city of New York, on the Atlantic, and the mouth of the Columbia, on the Pacific, by the construction of the northern Pacific railway, from the western boundary of Lake Superior, thus combining seventeen hundred miles of cheap water lines (to wit, thirteen hundred miles of river, canal, and lakes on the east, and four hundred miles of navigable waters of the Columbia river on the west) with fourteen hundred miles of railway intermediate; and whereas this combined water and railway communication, though situated in the forty-sixth degree of north latitude, passes through a rich agricultural and mineral country, with a climate as temperate as that of northern Pennsylvania, and must therefore forever afford the cheapest mode of transit across the continent, thus securing to our State the great flow of trade which must in the future inevitably sweep across our territory between eastern and southern Asia on the one side and western Europe on the other; and whereas the speedy development of the vast resources of our great country is demanded by every consideration of sound policy, with a view to the easy and early liquidation of our national debt; therefore

Resolved, That our senators and members in Congress be requested to advocate the passage of an act granting such government aid to the northern Pacific railway as will insure its early construction and completion.

Resolved, That the governor of the State be requested to transmit a copy of the foregoing preamble and resolution to each of our senators and members in Congress at as early a day as possible.

REPORT

COMMISSIONER OF THE LAND OFFICE

IN RESPONSE TO A RESOLUTION

OF THE SENATE, PASSED MAY 1, 1862

RELATIVE TO THE LANDS BELONGING TO THE UNITED STATES

IN ANSWER TO A RESOLUTION OF THE SENATE, PASSED MAY 1, 1862

RELATIVE TO THE LANDS BELONGING TO THE UNITED STATES

IN ANSWER TO A RESOLUTION OF THE SENATE, PASSED MAY 1, 1862

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IN ANSWER TO A RESOLUTION OF THE SENATE, PASSED MAY 1, 1862

RELATIVE TO THE LANDS BELONGING TO THE UNITED STATES

PENSIONS.

RESOLUTION

OF

THE LEGISLATURE OF WEST VIRGINIA,

ASKING

Additional pensions for the surviving soldiers of the war of 1812.

FEBRUARY 18, 1867.—Referred to the Committee on Invalid Pensions and ordered to be printed.

Resolved by the legislature of West Virginia, 1. That our senators and representatives in Congress be requested to procure, if possible, the passage of a law to increase the pensions of the surviving soldiers of the war of 1812.

2. That the governor be directed to certify and forward a copy of these resolutions to each of our senators and representatives in Congress.

Adopted January 28, 1867.

STATE OF WEST VIRGINIA,

Clerk's Office, House of Delegates :

I, William P. Hubbard, clerk of the house of delegates and keeper of the rolls of West Virginia, certify that the foregoing is a true transcript from the rolls in this office.

WILLIAM P. HUBBARD,

Clerk of House of Delegates and Keeper of the Rolls of West Virginia.

STATE OF WEST VIRGINIA,

Office of the Secretary of State :

I, Granville D. Hall, secretary of state aforesaid, hereby certify that the foregoing is a copy of the original filed in this office ; and further, that Wm. P. Hubbard, whose genuine signature is annexed to said original, is, as keeper of the rolls of this State, authorized to certify copies from the records of the legislature of this State.

Given under my hand and the great seal of said State, this 11th day of February, 1867.

[SEAL.]

GRANVILLE D. HALL,

Secretary of State.

TRANSIT

RESOLUTION

REPORT

THE LEGISLATURE
OF THE STATE OF NEW YORK

IN SENATE
JANUARY 18, 1894

REPORT
OF THE
COMMISSIONER OF THE LAND OFFICE
IN RESPONSE TO A RESOLUTION
PASSED BY THE SENATE
JANUARY 18, 1894

ALBANY:
JANUARY 18, 1894

AGRICULTURAL COLLEGE IN WEST VIRGINIA.

RESOLUTIONS

OF

THE LEGISLATURE OF WEST VIRGINIA,

REQUESTING

An additional appropriation of land by Congress to aid in establishing an agricultural college.

FEBRUARY 15, 1867.—Referred to the Committee on Agriculture and ordered to be printed.

Resolved by the legislature of West Virginia, That whereas the Congress of the United States did, by an act approved July 2, 1862, donate on certain conditions to the several States that might accept the same, land to the amount of 30,000 acres for each of their senators and representatives in Congress, the proceeds of which were to be applied to the purpose of endowing and supporting colleges to be established by the legislatures of the States so accepting the same, where, in conformity with the provisions of said act, a course of instructions should be established for the benefit of the industrial classes, in which, without excluding other scientific and classical studies, and embracing military tactics, particular prominence shall be given to such branches of learning as relate more particularly to agriculture and the mechanic arts, affording a thorough theoretical and practical education in the sciences connected therewith, so as to fit the classes for whose benefit it is more particularly instituted for the various pursuits and professions of life; and whereas the scrip for the land thus donated to and accepted by the State of West Virginia had necessarily to be thrown upon the market and sold, she having no public lands within her boundaries upon which the State could locate the same, and consequently her share in this donation, from the smallness of the quantity and of the price of public land scrip in the market at the time of sale, failed to realize to the State a sum adequate to the object contemplated, the donation to West Virginia being thus rendered vastly unequal in its value, in proportion to her population, to the donations under the same act to States containing within their boundaries public lands upon which they could locate their scrip, and thus throw the land thus acquired and not the scrip into the market; and whereas the State of West Virginia, born in revolution, and yet in her infancy, and having all her foundations to provide for, viz.; her State capitol, penitentiary, lunatic asylum, institutions for the education of her deaf and dumb and blind, as also a fund for popular education, thus imposing upon her a scale of taxation which her people are barely able to endure: Therefore be it

Resolved, That our senators in Congress be instructed and our representatives

requested to use their best exertions to secure the passage of an act donating to the State of West Virginia, for the purpose specified, an additional appropriation of land equal to sixty thousand acres for each of her senators and representatives in Congress.

Adopted January 24, 1867.

STATE OF WEST VIRGINIA,

Clerk's Office, House of Delegates:

I, William P. Hubbard, clerk of the house of delegates, and keeper of the rolls of West Virginia, certify that the foregoing is a true transcript from the rolls in this office.

WM. P. HUBBARD,
C. H. D. & K. R. West Virginia.

STATE OF WEST VIRGINIA,

Office of the Secretary of State:

I, Granville D. Hall, secretary of the State aforesaid, hereby certify that the foregoing is a copy of the original filed in this office, and, further, that Wm. P. Hubbard, whose genuine signature is annexed to said original, is, as keeper of the rolls of this State, authorized to certify copies from the records of the legislature of this State.

Given under my hand and the great seal of the said State this 11th day of February, 1867.

[SEAL.]

GRANVILLE D. HALL,
Secretary of State.

PARIS EXPOSITION.

MEMORIAL

FROM

THE LEGISLATURE OF WISCONSIN,

RELATIVE TO

The Paris Exposition.

FEBRUARY 15, 1867.—Referred to the Committee on Foreign Affairs and ordered to be printed.

The memorial of the legislature of the State of Wisconsin respectfully represents that an additional appropriation of money is required to defray the expense of transporting to Paris large quantities of articles now at New York and going forward for exhibition at the Paris Exposition of 1867. And your memorialists earnestly pray that Congress will make such an appropriation of public money as may be necessary for the purpose of forwarding said articles to Paris.

The governor of the State is hereby authorized and requested to affix his official signature hereto, and forward a copy of this memorial to the President of the United States, the President of the Senate, the Speaker of the House of Representatives, and to each of our senators and representatives in the Congress of the United States.

ANGUS CAMERON,
Speaker of the Assembly.
GEO. F. WHEELER,
President of the Senate pro tem.

Approved, February 9, 1867.

LUCIUS FAIRCHILD,
Governor.

STATE OF WISCONSIN, *Secretary's Office, ss:*

The secretary of state of the State of Wisconsin hereby certifies that the foregoing has been compared with the original enrolled memorial deposited in this office, and that the same is a true and correct copy thereof, and of the whole of such original.

In witness whereof, I have hereunto set my hand and affixed the great seal of the State, at the Capitol, in Madison, this 11th day of February, A. D. 1867.

[SEAL.]

THOS. S. ALLEN,
Secretary of State.

THE UNIVERSITY OF CHICAGO
LIBRARY
1000 S. MICHIGAN AVE.
CHICAGO, ILL. 60607

MEMORANDUM
TO THE PRESIDENT
FROM THE SECRETARY

THE UNIVERSITY OF CHICAGO
LIBRARY
1000 S. MICHIGAN AVE.
CHICAGO, ILL. 60607

AGENTS
JAMES C. GILBERT
JAMES C. GILBERT
JAMES C. GILBERT

THE UNIVERSITY OF CHICAGO
LIBRARY
1000 S. MICHIGAN AVE.
CHICAGO, ILL. 60607

COLORADO.

TELEGRAPHIC
DESPATCH FROM COLORADO,

TRANSMITTING

The resolutions of a mass meeting, held February 12, on the subject of admitting that Territory into the Union.

FEBRUARY 13, 1867.—Referred to the Committee on the Territories and ordered to be printed.

DENVER, COLORADO, *February 12, 1867.*

To the President of the United States Senate and Speaker of the House of Representatives :

Large and enthusiastic mass meeting this evening unanimously adopted the following preamble and resolution :

Whereas it has been falsely reported to Congress by interested parties that a majority of the people of Colorado are opposed to State organization ; and whereas the same unscrupulous parties have misrepresented our Territory and people in many other ways, by depreciating our wealth and prosperity, and falsifying our actual population : Now, therefore, we, the Union men of Arapaho county and many from other portions of the Territory, in mass convention assembled, do adopt the following :

Resolved, That to our certain knowledge the people of Colorado are very largely in favor of State organization.

Resolved, That we most respectfully and earnestly urge upon Congress the passage of the bill for our admission as a State, recently vetoed by the President.

Resolved, That we pledge the faith of the great national Union party we represent for the prompt acceptance of its conditions and the ratification of the constitutional amendment proposed by Congress.

Resolved, That the president of this meeting telegraph these resolutions to the President of the United States Senate and Speaker of the House of Representatives, with request to lay them before the respective Houses of Congress.

AMOS STECK, *President.*

COLORADO

THE LEGISLATIVE

DEPARTMENT FROM COLORADO

LEGISLATION

The committee of the House of Representatives, on the subject of admitting Colorado Territory into the Union.

Report of the Committee on the Territories and Insular Affairs.

By Mr. DUNN, Chairman, February 12, 1877.
To the President of the United States Senate and Speaker of the House of Representatives.

Large and enthusiastic meetings were held in the evening, and the following resolutions were adopted:

Whereas it has been falsely reported to Congress by interested parties that a majority of the people of Colorado are opposed to State organization; and whereas the same unscrupulous parties have misrepresented our Territory and people in many other ways by depicting our wealth and prosperity, and false and untrue population; Now, therefore, we, the Union men of Colorado, hereby and many from other portions of the Territory, in mass convention assembled, do adopt the following:

Resolved, That in our certain knowledge the people of Colorado are very largely in favor of State organization.

Resolved, That we most respectfully and earnestly urge upon Congress the passage of the bill for our admission as a State, recently passed by the President.

Resolved, That we pledge the faith of the great national Union party as represented in the prompt acceptance of its conditions and the protection of its constitutional amendment proposed by Congress.

Resolved, That the President of the United States telegraph these resolutions to the President of the United States Senate and Speaker of the House of Representatives, with request to lay them before the respective Houses of Congress.

AMOS STONER, President.

GREEN BAY AND LAKE PEPIN RAILWAY.

MEMORIAL
OF THE
LEGISLATURE OF WISCONSIN,
ASKING FOR

A grant of land to aid in the construction of the Green Bay and Lake Pepin railway.

FEBRUARY 13, 1867.—Referred to the Committee on Public Lands and ordered to be printed.

MEMORIAL to Congress for a grant of land to aid in the construction of the Green Bay and Lake Pepin railway.

To the honorable the Senate and House of Representatives of the United States in Congress assembled :

The memorial of the legislature of the State of Wisconsin respectfully represents that the Green Bay and Lake Pepin railway, starting from a point at or near the headwaters of Green bay, and terminating at the foot of Lake Pepin, in Buffalo county, is a work of great national importance, and will open to settlement a large extent of country that is now unprovided with roads or railroad facilities; that the country between Green bay and Lake Pepin embraces some of the richest farming and lumbering lands in the State, capable of sustaining a dense population, and the settlement thereof is almost prohibited for the want of railroad facilities; that it only requires an avenue through it to cause emigration to flow in and settle up this vast region, which otherwise must remain for a long period undeveloped, unless Congress grants its aid: Therefore, your memorialists respectfully ask that a grant of land be made to the Green Bay and Lake Pepin Railway Company to aid the said company in vigorously pushing to completion their road.

The governor of the State of Wisconsin is hereby requested to transmit a copy of this memorial to each of our senators and representatives in Congress, and also one to the President of the Senate and Speaker of the House of Representatives.

ANGUS CAMERON,
Speaker of the Assembly.
WYMAN SPOONER,
President of the Senate.

Approved February 6, 1867.

LUCIUS FAIRCHILD, *Governor.*

STATE OF WISCONSIN, *Secretary's Office*, ss :

The secretary of state of the State of Wisconsin hereby certifies that the foregoing has been compared with the original enrolled memorial deposited in this office, and that the same is a true and correct copy thereof, and of the whole of such original.

In witness whereof, I have hereunto set my hand and affixed the great seal of the State, at the capitol in Madison, this eighth day of February, A. D. 1867.

[SEAL.]

THOS. S. ALLEN,
Secretary of State.

BOUNTY TO SOLDIERS WHO HAVE LOST THEIR DISCHARGE
PAPERS.

RESOLUTIONS

OF

THE HOUSE OF REPRESENTATIVES OF PENNSYLVANIA,

ASKING

Congress to pass a law allowing bounty to soldiers who received an honorable discharge, but lost the same.

FEBRUARY 12, 1867.—Referred to the Committee on Invalid Pensions and ordered to be printed.

JOINT RESOLUTION requesting Congress to pass such laws as will enable soldiers who have lost their discharges to receive the one hundred dollars bounty, under the act of Congress of July twenty-eighth, one thousand eight hundred and sixty-six.

Whereas, by a late decision of the Paymaster General, at Washington, soldiers who have lost their discharges are not able to draw the one hundred dollars authorized by act of Congress of July twenty-eighth, one thousand eight hundred and sixty-six ;

And whereas this decision does great injustice to many brave soldiers who, for causes beyond their control, have lost their discharges : Therefore,

Resolved by the senate and house of representatives of the Commonwealth of Pennsylvania in general assembly met, That the senators and representatives from Pennsylvania in the Congress of the United States be, and are hereby, requested to vote for, and use their influence for, the passage of such a law as will enable those soldiers who have lost their discharges from the United States army, and whose names are borne on the muster-rolls of their respective organizations as having been honorably discharged from the service of the United States, to receive the bounty now allowed by law.

Resolved, That the governor of Pennsylvania be, and is hereby, requested to forward a copy of these resolutions to each member of the United States Senate and House of Representatives from Pennsylvania.

JOHN P. GLASS,

Speaker of the House of Representatives.

L. W. HALL,

Speaker of the Senate.

Approved the seventh day of February, anno Domini one thousand eight hundred and sixty-seven.

JNO. W. GEARY.

SYMPATHY FOR THE GREEKS.

CONCURRENT RESOLUTION

OF

THE LEGISLATURE OF NEW YORK,

EXPRESSIVE OF

Sympathy for the Greeks, who are now struggling for freedom.

FEBRUARY 16, 1867.—Referred to the Committee on Foreign Affairs and ordered to be printed.

Resolved, That the legislature of the State of New York desires to express its sympathy for the Greeks, who are now struggling for freedom. As the memory of the old Greek valor nerved the army of our ancestors in their struggle for independence, so it is now our duty to encourage their descendants; and we respectfully request our national government to protest against the barbarous and inhuman system of warfare adopted by the Turks, and to give orders to the commanders of our vessels-of-war in the Mediterranean, as well as to our consuls and other officers, to do everything in their power to mitigate the atrocities of war that is not inconsistent with our neutrality.

REPORT OF THE

COMMISSIONER OF THE LAND OFFICE

IN RESPONSE TO A RESOLUTION PASSED BY THE SENATE

PASSED MAY 18, 1889.

ALBANY: J. B. LEECH, STATE PRINTER, 1890.

ALBANY, JANUARY 18, 1890.—I have the honor to acknowledge the receipt of your communication of the 14th inst., and in reply to inform you that the same has been forwarded to the proper authorities for their consideration. I am, Sir, very respectfully,
Your obedient servant,
J. B. LEECH, STATE PRINTER.

SUFFRAGE IN THE DISTRICT OF COLUMBIA.

RESOLUTIONS

OF

THE LEGISLATURE OF NEW YORK,

HEARTILY APPROVING

Of the action of Congress in passing the District of Columbia suffrage bill over the President's veto.

FEBRUARY 15, 1867.—Laid on the table and ordered to be printed.

STATE OF NEW YORK, EXECUTIVE DEPARTMENT,

Albany, February 14, 1867.

SIR: I have the honor to transmit a copy of concurrent resolutions passed by the legislature approving the action of Congress in relation to the District of Columbia suffrage bill.

Very respectfully,

R. E. FENTON.

Resolved, That we heartily approve of the action of Congress for their prompt action in passing the District of Columbia suffrage bill over the President's veto.

Resolved, That his excellency the governor be requested to transmit to each of our senators and representatives in Congress a copy of the foregoing resolution.

SUBMITTED IN THE DISTRICT OF COLUMBIA

RESOLUTIONS

THE LEGISLATURE OF NEW YORK

IN SENATE

Resolved, That the Senate do pass the following Resolutions, and the President's veto.

Resolved, That the Senate do pass the following Resolutions, and the President's veto.

State of New York, 1857.

January 14, 1857.

That I have the honor to transmit a copy of the following Resolutions, passed by the Legislature, approved the 13th day of January, 1857, to the President of the United States, for his consideration.

W. L. GAYTON.

Resolved, That the Senate do pass the following Resolutions, and the President's veto.

Resolved, That the Senate do pass the following Resolutions, and the President's veto.

CAPITOL AND PENITENTIARY IN NEW MEXICO.

MEMORIAL

OF

THE LEGISLATURE OF NEW MEXICO,

FOR

Appropriation to complete the capitol and penitentiary in that Territory.

FEBRUARY 14, 1867.—Referred to the Committee on Territories and ordered to be printed.

To the honorable the Senate and House of Representatives of the Congress of the United States:

Your memorialists, the legislative assembly of the Territory of New Mexico, very respectfully represent that the last legislative assembly of this Territory unanimously addressed a memorial to your honorable bodies in regard to an appropriation being made to complete the capitol and penitentiary, which buildings have been commenced in Santa Fé, New Mexico, but not completed. We do now sincerely indorse said memorial, and pray your honorable bodies to make the necessary appropriation to complete said buildings, which, if not finished at an early day, the materials and work already done on said buildings will soon go to ruin. Criminals go unpunished for the reason that the criminal laws cannot be executed, and public peace and security cannot be secured without a penitentiary.

The federal officers of the government, as also the legislative assembly, are not able to procure suitable rooms for their officers, and the last for their meetings, without paying an exorbitant rent therefor, which in a few years will amount to a greater sum than that required for the completion of the capitol buildings.

Your memorialists further represent that the honorable secretary of the Territory and superintendent of public buildings have made an estimate of nine thousand five hundred dollars for the repair of the palace building belonging to the government, which estimate has been forwarded to the honorable Secretary of the Treasury and the Register of that department. This building is one of the oldest in the United States, and with the sum required it could be put in a good state of repair, and thereby save considerable rents which are now paid, and which would increase the value of the building much more than the sum asked for to repair it.

Your memorialists pray the favorable consideration of your honorable bodies in this matter, and, as in duty bound, will ever pray.

RESOLUTION.

Resolved by the council of the legislative assembly, (the house of representatives concurring therein,) That the honorable secretary of the Territory be, and is hereby, required to forward certified copies of the memorials adopted by the last legislature to his excellency the President of the United States, to the honorable Secretary of the Treasury, to the President of the Senate, and to the Speaker of the House of Representatives of the Congress of the United States, to the chairmen of the Committees on Territories of the Senate and House of Representatives, and to the honorable J. Francisco Chaves, our delegate in Congress.

MIGUEL E. PINO,

President of the Council.

R. M. STEPHENS,

Speaker of the House of Representatives.

Approved January 18, 1867.

W. F. M. ARNY,

Acting Governor.

UNITED STATES OF AMERICA, *Territory of New Mexico:*

I, W. F. M. Arny, secretary and acting governor of New Mexico, do hereby certify that the foregoing is a true copy of the original which is on file in my office, as passed by the legislative assembly of the Territory of New Mexico at its present session.

In testimony whereof, I have hereunto signed my name and affixed my official seal this 21st day of January, A. D. 1867.

[SEAL.]

W. F. M. ARNY,

Secretary and Acting Governor, New Mexico.

To the honorable Congress of the United States:

Your memorialists, the legislative assembly of the Territory of New Mexico, would respectfully represent:

That by an act of Congress approved March 3, 1863, the sum of \$20,000 was appropriated for the purchase of a site and the erection of a penitentiary in the Territory of New Mexico. David Merriwether, governor of the Territory, and, by appointment of the Secretary of the Treasury, commissioner and disbursing agent for the public buildings of New Mexico, proceeded, in the winter of 1854 and the spring of 1855, to select a site and commence the erection of a penitentiary.

Plans and drawings were forwarded from the Treasury Department, upon which Governor Merriwether, as commissioner, directed the superintendent to proceed to construct the work. It was evident to all the least conversant with such work, that in New Mexico, where so many difficulties are met with in such class of constructions, the appropriations would not half complete the structure called for by the plans, elevations, and specifications forwarded by the Treasury Department; and, furthermore, that, could the buildings have been completed, they would not have been adequate to the necessities of the Territory.

The work was carried on according to the plan until the appropriation was exhausted, when the work ceased, in April, 1857. The heavy stone foundations of the outer wall of the prison yard, laid in cement, eighteen cells completed—this, with the delivery of a large amount of massive stone on the ground, is all that the \$20,000 accomplished.

Your memorialists have repeatedly brought this matter to the attention of Congress, but as yet with no favorable result. But in view of the known generosity and justice of the United States toward the Territories, and being fully impressed with the belief that the importance of carrying out the laws, and the suppression of crime, and insuring the common peace and safety of the Territory, are appreciated by Congress, that you will not permit this building to stand unfinished and useless, decaying by exposure, a reproach upon the liberality and justice of the government: Therefore,

Your memorialists would further represent that, for want of this penitentiary, criminals convicted of the highest crimes and misdemeanors roam the Territory with impunity and go unpunished, there being no jails or prisons in any part of the Territory adequate for their safe detention, or to enable the officers of justice to enforce the sentence of the law. The administration of the criminal law has, in consequence, in many parts of the Territory, become almost a mockery; so murderers often escape punishment, and thieves go at large to renew their depredations, and the law cannot be enforced against them, nor can they be restrained from the further commission of crime unless a place of secure confinement be provided.

Your memorialists would, therefore, ask your honorable bodies to make an appropriation of \$75,000 and machinery necessary, for the purchase of a site at or near some stream where water can be obtained, so as to run machinery, and where the convicts can be made to work, and thus support themselves at less expense to the government of the United States and this Territory.

Your memorialists would also ask that authority be given to the honorable Secretary of the United States Treasury to have the stone and material in the present penitentiary used in finishing the capitol building, and the site sold and the proceeds appropriated to the purchase of a new site where there is a sufficiency of water.

Your memorialists respectfully refer to Hon. J. Francisco Chavez, our delegate in Congress, for further particulars and explanations in regard to the urgent necessity for a penitentiary in New Mexico.

UNITED STATES OF AMERICA, *Territory of New Mexico*:

I, W. F. M. Arny, secretary and acting governor of New Mexico, do hereby certify that the foregoing is a true copy of the original as it unanimously passed by the legislative assembly of the Territory at their sessions held in 1865 and 1866.

In testimony whereof, I have hereunto signed my name and affixed the great seal of the Territory, this 25th day of January, 1867.

[SEAL.]

W. F. M. ARNY,
Secretary and Acting Governor of New Mexico.

To the honorable Congress of the United States of America:

The memorial of the legislative assembly of the Territory of New Mexico respectfully sheweth, that the amounts appropriated by Congress for the completion of a territorial capitol at Santa Fé having been expended previous to the month of April, 1857, and the subsequent appropriation not being sufficient to complete the work, the building has remained in an unfinished condition, exposed to the vicissitudes of the weather for several years past, from which unavoidable exposure much damage and loss has naturally resulted to the wood-work and material on hand, and the building is in such a condition that it cannot be used until completed.

All the details in respect to this most important work are contained in the

reports of the various officers in charge of the works, and which are on file in the Treasury Department.

An estimate was made by competent workmen and forwarded to the Treasury Department by the Hon. W. F. M. Arny, secretary of the Territory, who was appointed last year by the Hon. Secretary of the Treasury to look after the public buildings and report. In consequence of the losses and damages sustained by this building in its unfinished condition for several years, and the further exposure before work can again commence on it, the estimate of the work for the completion is stated at one hundred and twenty thousand dollars. The Hon. Secretary of the Territory, after a thorough investigation, reports that an appropriation of seventy thousand dollars in addition to what has been appropriated will be sufficient to complete the building, and furnish it for the use of the legislature and the offices of the government.

Your memorialists, therefore, respectfully urge that an additional appropriation of seventy thousand dollars be made by Congress for that purpose. And, as in duty bound, your petitioners will ever pray, &c.

UNITED STATES OF AMERICA, *Territory of New Mexico* :

I, W. F. M. Arny, secretary and acting governor of New Mexico, do hereby certify that the foregoing is a true copy of the original, as it passed unanimously by the legislative assembly of the Territory, at their sessions held in 1865 and 1866.

In testimony whereof, I have hereunto signed my name, and affixed the great seal of the Territory, this 25th day of January, 1867.

[SEAL.]

W. F. M. ARNY,

Secretary and Acting Governor, New Mexico.

ROADS AND BRIDGES.

RESOLUTION

OF

THE LEGISLATURE OF WEST VIRGINIA,

ASKING

An appropriation by Congress to aid in rebuilding certain roads and bridges destroyed during the late war.

FEBRUARY 18, 1867.—Referred to Committee on Appropriations and ordered to be printed.

Resolved by the legislature of West Virginia, 1. That our senators and representatives in Congress be requested to ask for an appropriation of five hundred thousand dollars for the purpose of assisting in the reconstruction of the roads and bridges destroyed in this State by the United States troops during the late rebellion.

2. That a copy of the foregoing resolution, duly certified by the clerk of the house of delegates, be forwarded to each of our senators and representatives in Congress.

Adopted January 30, 1867.

STATE OF WEST VIRGINIA,
Clerk's Office, House of Delegates.

I, William P. Hubbard, clerk of the house of delegates and keeper of the rolls of West Virginia, certify that the foregoing is a true transcript from the record in this office.

WILLIAM P. HUBBARD,
C. H. D. & K. of R. of West Virginia.

STATE OF WEST VIRGINIA,
Office of the Secretary of State.

I, Granville D. Hall, secretary of the State aforesaid, hereby certify that the foregoing is a copy of the original filed in this office; and further, that William P. Hubbard, whose genuine signature is annexed to said original, is, as keeper of the rolls of this State, authorized to certify copies from the records of the legislature of this State.

Given under my hand and the great seal of said State, this 11th day of February, 1867.

[SEAL.]

GRANVILLE D. HALL,
Secretary of State,

THE LEGISLATURE OF NEW YORK

IN SENATE,
January 10, 1897.

REPORT OF THE
COMMISSIONER OF THE LAND OFFICE

IN RESPONSE TO A RESOLUTION
PASSED BY THE SENATE
MAY 1, 1896.

ALBANY:
J. B. LIPPINCOTT & CO.,
PRINTERS.

1897.

WILLIAM F. DUBOIS,
C. M. D. & Z. N. W. D. D. D.

State of New York.

Office of the Commissioner of the Land Office,
Albany, N. Y., January 10, 1897.

GRANTVILLE D. HALL,
County of ...

NAVY YARD AT MOUND CITY.

RESOLUTION
OF
THE LEGISLATURE OF ILLINOIS,
RELATIVE TO
A navy yard at Mound City.

FEBRUARY 18, 1867.—Referred to the Committee on Naval Affairs and ordered to be printed.

Whereas the Navy Department has expended over one hundred thousand dollars for a navy yard at Mound City, Illinois, and has left the same uncompleted; and

Whereas the thirteen iron-clad monitors now anchored at Mound City, together with the other interests of the western branch of our navy, require a western navy-yard which can be completed at Mound City for a small additional expenditure: Therefore,

Resolved by the house of representatives, (the senate concurring herein,) That our senators in Congress be instructed, and our representatives earnestly requested, without delay, to use all honorable means to secure the passage of a bill through Congress making such appropriation as may be found necessary to complete the navy yard at Mound City, and that the clerk of the house, immediately upon the passage of this preamble and resolution, send a certified copy thereof to each of our senators and representatives in Congress.

Which preamble and resolution were adopted by the house on the day and year aforesaid.

A true copy from the journal of the house.

Attest:

S. G. PADDOCK,
Clerk of the House of Representatives.

Concurred in by the senate Thursday, January 31, 1867.

Attest:

S. G. PADDOCK,
Clerk of the House of Representatives.

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INCREASE OF PAY.

MEMORIAL

OF THE

LEGISLATURE OF THE TERRITORY OF NEW MEXICO,

ASKING

An increase per diem of the members of the legislative assembly, and an increase of pay of the territorial officers.

FEBRUARY 18, 1867.—Referred to the Committee on the Territories and ordered to be printed.

To the honorable the Congress of the United States :

Your memorialists, the legislative assembly of the Territory of New Mexico, respectfully represent, that whereas the organic act of this Territory provides that the pay per diem of the members of the legislative assembly shall be three dollars during their attendance at the session thereof, and the officers of the said legislative assembly are allowed a compensation in like proportion ; and whereas, on account of the great distance from the manufacturing and producing sections whence they obtain nearly all the necessary articles of consumption, such as provisions, clothing, &c., the cost of such articles is twice, and in many instances three times the cost of similar commodities in the more eastern parts of the United States ; and whereas it is manifestly unjust that said compensation should be made at so low a rate : therefore your memorialists would respectfully ask your honorable body so to amend the organic act as to allow five dollars per diem for each member and officer in attendance at the session of the legislative assembly, and an adequate addition to the salaries of the governor, secretary, and superintendent of Indian affairs of this Territory ; as also to the salaries of each of the three territorial judges, the United States district attorney, and marshal, and an increase per diem to the clerks of the district courts, and to the members of the United States grand juries.

And your memorialists, as in duty bound, will ever pray.

Resolved, That the Hon. W. F. Arny, secretary of the Territory of New Mexico, be, and is hereby, required to forward a copy of the foregoing to the President of the United States Senate, the Speaker of the House of Representatives, and the honorable chairman of the committees of Congress on the Territories, and to the Hon. J. Francisco Chaves, our delegate in Congress.

UNITED STATES OF AMERICA, *Territory of New Mexico :*

I, W. F. M. Arny, secretary and acting governor of New Mexico, do hereby certify that the foregoing is a true copy of the original, which is on file in my office, as passed by the legislative assembly of the Territory of New Mexico at its present session.

In testimony whereof I have hereunto signed my name and affixed my official seal this 19th day of January, A. D. 1867.

[SEAL.]

W. F. M. ARNY,
Secretary and Acting Governor of New Mexico.

MINERAL RANGE RAILROAD.

RESOLUTIONS

OF

THE LEGISLATURE OF MICHIGAN,

FOR

A grant of land for the benefit of the Mineral Range railroad.

FEBRUARY 18, 1867.—Referred to the Committee on the Public Lands and ordered to be printed.

Whereas the development of the mineral resources of the Lake Superior region of the State of Michigan has become a subject of national importance ; and whereas the greater portion of the mineral range of said region, extending from Keweenaw Point to nearly the west end of Lake Superior, is distant from a safe harbor, and approachable only by land carriages, the expense of which is so great as to preclude the successful opening and working of the mines ; and whereas a company for the construction of a railroad from Lac La Belle to the Cliff Mine, in Keweenaw county, and thence along the mineral range to some point on the Montreal river, (or the head of Lake Superior,) has perfected its organization under the laws of the State of Michigan, which company proposes to build said road within ten years ; and whereas the construction of said road will open to the markets of the world the inexhaustible wealth of said mineral range, giving employment to thousands of laborers, and adding largely to the national revenue ; and whereas the national government has practiced this policy of disposing of the public domain as a proper means to develop the resources of the country, and has made liberal grants of land to aid in the construction of railroads : Therefore,

Resolved by the senate and house of representatives of the State of Michigan, That we respectfully ask the Congress of the United States to grant the State of Michigan fifteen sections of land for each mile of the length of said road, to be selected from the lands belonging to the general government in the upper peninsula, and authorizing any company that may build said railroad to sell seventy sections of land upon the completion of every ten consecutive miles of said railroad.

Resolved, That our senators in Congress be instructed, and our representatives requested, to use all honorable means to secure the immediate grant of said lands for the purpose set forth in the preamble to these resolutions.

Resolved, That the governor be requested to transmit copies of the foregoing preamble and resolutions to our senators and representatives in Congress.

HENRY H. CRAPO.

THE UNIVERSITY OF CHICAGO

REPORT

THE UNIVERSITY OF CHICAGO

A report of the progress of the work of the University of Chicago during the year 1900-1901.

IV. The University of Chicago has been fortunate in having secured the services of several of the most distinguished scholars in the world. These scholars have been able to devote their entire time to the study of the subjects which they have chosen, and have been able to make the most important contributions to the knowledge of these subjects. The University has been able to secure the services of these scholars at a very small cost, and has been able to make the most important contributions to the knowledge of these subjects. The University has been able to secure the services of these scholars at a very small cost, and has been able to make the most important contributions to the knowledge of these subjects.

THE UNIVERSITY OF CHICAGO

IMPROVEMENT OF PORTAGE LAKE.

RESOLUTIONS

OF

THE LEGISLATURE OF MICHIGAN,

RELATIVE TO

The improvement of Portage lake and river, in Houghton county.

FEBRUARY 18, 1867.— Referred to the Committee on Commerce and ordered to be printed.

Whereas Portage lake is distant about four miles from Keweenaw bay, (Lake Superior,) connected therewith by Portage river; and whereas a company has been duly organized under the laws of the State of Michigan by the name of the Portage Lake and River Improvement Company, having for its object the improvement of said river so as to admit the passage of steamers and sailing vessels into Portage lake; and whereas a large sum of money has been expended in said improvement, and yet it is difficult to navigate said river, the channel being too narrow, crooked, and not of sufficient depth, the larger steamers and vessels being compelled to lighten before they can pass through; and whereas Congress has heretofore made liberal appropriations of money for the improvement of harbors and rivers in different parts of the Union, but has not, as yet, made any for the improvement of those on Lake Superior, notwithstanding the rapid growth of our commerce and the imperative necessity of these improvements: Therefore,

Resolved by the senate and house of representatives of the State of Michigan. That our senators in Congress and the members of the House of Representatives be requested to use their influence to obtain from Congress an appropriation in money for the improvement of said Portage lake and river.

Resolved, That his excellency the governor be requested to transmit copies of the foregoing preamble and resolutions to our senators and representatives in Congress.

HENRY H. CRAPO.

REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE

IN

RESPONSE TO A RESOLUTION

OF

THE LEGISLATURE OF THE UNITED STATES OF AMERICA

PASSED

AT THE ANNUAL SESSION OF 1877

IN SENATE CONFIRMED

JANUARY 1878

THE COMMISSIONER OF THE GENERAL LAND OFFICE, in response to a resolution of the Senate of the United States, passed at its session in 1877, has the honor to submit herewith a report on the subject of the lands of the United States, and on the manner in which they are managed and disposed of. The report is divided into two parts: the first part contains a general statement of the lands of the United States, and the second part contains a detailed statement of the lands of the United States, and of the manner in which they are managed and disposed of. The report is divided into two parts: the first part contains a general statement of the lands of the United States, and the second part contains a detailed statement of the lands of the United States, and of the manner in which they are managed and disposed of.

WILLIAM M. CHASE

COMMISSIONER OF THE GENERAL LAND OFFICE

WASHINGTON, D. C., JANUARY 1878

SCHOOLS IN NEW MEXICO.

MEMORIAL

OF THE

LEGISLATURE OF THE TERRITORY OF NEW MEXICO,

ASKING

That an appropriation of money for school purposes be made instead of the sixteenth and thirty-sixth sections of land.

FEBRUARY 18, 1867.—Referred to the Committee on the Territories and ordered to be printed.

To the Congress of the United States :

Your memorialists, the legislative assembly of the Territory of New Mexico, would most respectfully represent : That the provisions made by Congress for school purposes in this Territory are entirely inadequate. The peculiar topography of New Mexico renders unavailable the sixteenth and thirty-sixth sections of land set apart by Congress, and therefore leaves this Territory without any means for school purposes so far as the United States is concerned, and unless your honorable bodies should see proper to make an appropriation in money, in proportion to the sums equal to those granted to other States and Territories, this Territory will be left without aid from the general government.

In 1860, the population of this Territory ascended to 93,516 persons, of which number 57,233 could not read or write, and at this date there is not one public school in this Territory. We therefore pray your honorable bodies to be pleased to make an appropriation in money in lieu of the lands set apart as aforesaid for school purposes in this Territory.

And your memorialists, as in duty bound, will ever pray.

Resolved by the council of the legislative assembly, (the house of representatives concurring therein,) That the honorable secretary of the Territory be, and he is hereby, requested to forward certified copies of the foregoing to the President of the Senate, to the Speaker of the House of Representatives of the Congress of the United States, and to the Hon. J. Francisco Chaves, our delegate to Congress.

MIGUEL E. PINO,

President of Council,

R. M. STEPHENS,

Speaker of House of Representatives.

UNITED STATES OF AMERICA, *Territory of New Mexico* :

I, W. F. M. Arny, secretary and acting governor of New Mexico, do hereby certify that the foregoing is a true copy of the original, which is on file in my office, as passed by the legislative assembly of the Territory of New Mexico at the present session.

In testimony whereof I have hereunto signed my name and affixed my official seal, this 22d day of January, A. D. 1867.

[SEAL.]

W. F. M. ARNY,
Secretary and Acting Governor New Mexico.

LOSSES BY CITIZENS OF NEW MEXICO.

MEMORIAL

OF THE

LEGISLATURE OF THE TERRITORY OF NEW MEXICO,

RELATIVE TO

Losses sustained by the citizens of the Territory during the revolution of 1847, and by Indian depredations, from the arrival and formal taking possession of the Territory by General Stephen W. Kearney.

FEBRUARY 18, 1867.—Referred to the Committee on the Territories and ordered to be printed.

To the honorable the Congress of the United States of America :

Your memorialists, the legislative assembly of the Territory of New Mexico, would respectfully represent that in 1847, by a revolution and by Indian depredations since that period, many of our citizens have met with loss of life and property.

By the reports which are on file in the office of the secretary of the Territory, the loss of life and property is as follows: 123 persons killed, 32 persons wounded, 21 persons taken captive. Property stolen: 3,559 horses, mules, and asses, 13,473 head of cattle, and 294,740 head of sheep and goats, valued at the total sum of (\$1,377,329 60) *one million three hundred and seventy-seven thousand three hundred and twenty-nine dollars and sixty cents.*

In 1847, when General Kearney took possession of New Mexico, in his proclamation to the people he promised, on the part of the United States, protection to our people against such losses, and the government of the United States solemnly ratified that promise afterwards by treaty.

Nearly twenty years have expired since our Territory was received as such by treaty, and the protection of the United States pledged to us, and during all that number of years our people have been suffering unceasingly from the loss of life and property occasioned by the incursions made upon them by the tribes of hostile Indians, notwithstanding the vigilance and efforts of ourselves and the troops of the government.

Such has been the condition of affairs in this Territory for a series of years; and although some provisions have been made by the Congress of the United States to reimburse such of our citizens as have been robbed, by the savages, of their property, it has as yet been found impracticable, on account of the complicated requisites of the law on the subject, for those who have suffered the loss to comply with the requirements of the law, in making up their claims for indemnification.

Your memorialists, in view of the facts above mentioned, and the impossibility of remedying them under existing laws, would most respectfully request that a sufficient appropriation be made by your honorable body to indemnify the sufferers, and that a board of commissioners be created, to consist of three persons appointed by the honorable Secretary of the Interior Department, to hear the complaints of our people, to examine the testimony presented to establish the losses our citizens have suffered by the revolution of 1847, and the Indian depredations since that period, and to report to the Secretary of the Interior Department the amount that should be paid to the people of New Mexico, so that those who are rightfully entitled may receive their just dues.

And your memorialists, as in duty bound, will ever pray.

Resolved by the council, (the house of representatives concurring therein,) That the honorable secretary of the Territory be, and is hereby, requested to forward certified copies of the foregoing to his Excellency the President of the United States, to the honorable Secretary of the Interior Department, to the honorable Commissioner of Indian Affairs, to the President of the United States Senate, the Speaker of the House of Representatives, to the chairmen of the Committees on Indian Affairs in Congress, and to the Hon. J. Francisco Chaves, our delegate in Congress.

UNITED STATES OF AMERICA,

Territory of New Mexico.

I, W. F. M. Arny, secretary and acting governor of New Mexico, do hereby certify that the foregoing is a true copy of the original which is on file in my office, as passed by the legislative assembly of the Territory of New Mexico at its present session.

In testimony whereof I have hereunto signed my name and affixed my official seal this 16th day of January, A. D. 1867.

[SEAL.]

W. F. M. ARNY,

Secretary and Acting Governor New Mexico.

CONSTITUTIONAL AMENDMENT.

RESOLUTION

OF

THE LEGISLATURE OF NEW YORK,

IN RELATION TO

The proposed amendment of the Constitution of the United States.

FEBRUARY 15, 1867.—Laid on the table and ordered to be printed.

STATE OF NEW YORK, *Office of the Secretary of State:*

I, Francis C. Barlow, secretary of state of the State of New York, do hereby certify that the annexed is a true copy of a concurrent resolution of the legislature of this State, "ratifying an amendment to the Constitution of the United States," passed January 10, 1867, as taken from the original on file in this office.

[SEAL.] In testimony whereof, I have hereunto subscribed my name and affixed the great seal of the State of New York, the eleventh day of January, A. D. 1867.

FRANCIS C. BARLOW,
Secretary of State.

Whereas, at a session of the thirty-ninth Congress, it was

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, (two-thirds of both houses concurring,) That the following article be proposed to the legislatures of the several States as an amendment to the Constitution of the United States, which, when ratified by three-fourths of said legislatures, shall be valid to all intents and purposes, as a part of the said Constitution, viz:

ARTICLE XIV.

SECTION 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States, and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States, nor shall any State deprive any person of life, liberty or property, without due process of law, nor to deny any person within its jurisdiction the equal protection of the law.

SEC. 2. Representatives shall be apportioned among the several States accord-

ing to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice-President of the United States, representatives in Congress, the executive or judicial officers of a State, or the members of the legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age and citizens of the United States, or in any way abridged, except for participation in rebellion, or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens, twenty-one years of age in such State.

SEC. 3. No person shall be a senator or representative in Congress, or elector of President or Vice-President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may, by a vote of two-thirds of each house, remove such disability.

SEC. 4. The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States, nor any State, shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

SEC. 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article: Therefore,

Resolved, (if the assembly concur,) That the said proposed amendment to the Constitution of the United States be, and the same is, hereby ratified by the legislature of the State of New York.

TENNESSEE PACIFIC RAILROAD.

RESOLUTION

OF

THE LEGISLATURE OF TENNESSEE,

ASKING

For grant of public lands to aid in the construction of the Tennessee branch of the Pacific railroad.

FEBRUARY 19, 1867.—Referred to the Committee on the Pacific Railroad and ordered to be printed.

Whereas the Tennessee Pacific Railroad Company, recently chartered by the general assembly of this State, has memorialized Congress for a grant of public lands in aid of the construction of the road as a necessary link in the connection of the road between the Atlantic and Pacific on the shortest route through the interior of the country, the said road connecting by the way of Memphis, Little Rock, and Fort Smith with the road chartered by Congress through Arkansas, Indian territory, and northern Texas, &c. :

Resolved by the general assembly of the State of Tennessee, That having in view the importance of the enterprise in binding together all the sections of the State, in developing its mineral resources, in opening to population and settlement so large a tract of soil of the greatest capabilities, in addition to the national importance of the work, the said grant of public land (to be located on or near the line of the intersection of the road west of the Mississippi) is respectfully and urgently recommended, and the senators and representatives of the State are requested to urge the matter upon the attention of the Congress.

Adopted February 7, 1867.

J. S. MULLOY,

Speaker pro tem. of the House of Representatives.

JOSHUA B. FRIERSON,

Speaker of the Senate.

I, Andrew J. Fletcher, secretary of state of the State of Tennessee, do certify that the foregoing is a copy of a joint resolution of the general assembly of the State of Tennessee, the original of which is now on file in my office.

In testimony whereof, I have hereunto subscribed my official signature, and, by order of the governor, affixed the great seal of the State of Tennessee, at the department in the city of Nashville, this 16th day of February, A. D. 1867.

[SEAL.]

A. J. FLETCHER,

Secretary of State.

RESOLUTION

THE JOURNAL OF THE HOUSE

Resolved, That the Committee on the Journal be authorized to report to the House the following resolution, to wit: That the Journal of the House be printed and bound in the same manner as the Journal of the Senate, and that the same be distributed to the members of the House.

Approved January 7, 1857.

J. B. BURTON,
Speaker pro tem of the House of Representatives.

J. B. BURTON,
Speaker pro tem of the House of Representatives.

CONSTITUTIONAL AMENDMENT.

RESOLUTION

OF

THE LEGISLATURE OF PENNSYLVANIA,

ANNOUNCING

The ratification of the constitutional amendment.

FEBRUARY 20, 1867.—Laid on the table and ordered to be printed.

JOINT RESOLUTION to ratify the amendment to the Constitution of the United States.

Whereas two-thirds of the members of the Senate and House of Representatives of the United States, in Congress assembled, did adopt an amendment to the Constitution of the United States, which is entitled article fourteen, as follows:

SECTION 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any laws which shall abridge the privileges or immunities of citizens of the United States, nor shall any State deprive any person of life, liberty, or property without due process of law, nor deny to any person within its jurisdiction the equal protection of the law.

SEC. 2. Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice-President of the United States, representatives in Congress, the executive and judicial officers of a State, or the members of the legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

SEC. 3. No person shall be a senator or representative in Congress, or elector of President and Vice-President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof; but Congress may, by a vote of two-thirds of each house, remove such disability.

SEC. 4. The validity of the public debt of the United States authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned; but neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

SEC. 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

Which said amendment has been submitted to the legislature of Pennsylvania for ratification or rejection: Therefore,

Be it resolved by the senate and house of representatives of the State of Pennsylvania in general assembly met, That the amendment, as above proposed and submitted, is hereby ratified and adopted by the State of Pennsylvania.

JOHN P. GLASS,

Speaker of the House of Representatives.

L. W. HALL,

Speaker of the Senate.

Approved the thirteenth day of February, one thousand eight hundred and sixty-seven.

JNO. W. GEARY.

OFFICE OF THE SECRETARY OF THE COMMONWEALTH,

Harrisburg, February 19, 1867.

PENNSYLVANIA, ss:

I do hereby certify that the foregoing and annexed is a full, true, and correct copy of the original joint resolution of the general assembly of the Commonwealth of Pennsylvania, entitled "Joint resolution to ratify the amendment to the Constitution of the United States," as the same remains on file in this office.

In testimony whereof, I have hereunto set my hand and caused the seal of the secretary's office to be affixed the day and year above written.

[SEAL.]

ISAAC B. GARA,

Deputy Secretary of the Commonwealth.

CONSTITUTIONAL AMENDMENT.

RESOLUTIONS

OF

THE LEGISLATURE OF RHODE ISLAND,

ADOPTING

The constitutional amendment.

FEBRUARY 21, 1867.—Referred to the Committee on the Judiciary and ordered to be printed.

Whereas both houses of the Congress of the United States have proposed an amendment to the Constitution of the United States, in the words and figures following, to wit :

‘JOINT RESOLUTION proposing an amendment to the Constitution of the United States.

“ *Be it resolved by the Senate and House of Representatives of the United States of America in Congress assembled, (two-thirds of both houses concurring,) That the following article be proposed to the legislatures of the several States, as an amendment to the Constitution of the United States, which, when ratified by three-fourths of said legislatures, shall be valid as a part of the Constitution, namely :*

“ARTICLE XIV.

“SECTION 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States ; nor shall any State deprive any person of life, liberty, or property, without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

“SEC. 2. Representatives shall be apportioned among the several States, according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice-President of the United States, representatives in Congress, the executive or judicial officers of a State, or the members of the legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

"SEC. 3. No person shall be a senator or representative in Congress, or elector of President and Vice-President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath, as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may, by a vote of two-thirds of each house, remove such disability.

"SEC. 4. The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume to pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

"SEC. 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article."

It is therefore—

Resolved, That the legislature of the State of Rhode Island do hereby ratify and confirm the said fourteenth article of amendment to the Constitution of the United States, and do hereby assent thereto.

Resolved, That his excellency the governor be, and he hereby is, directed to cause a copy of the foregoing preamble and resolution to be made and duly authenticated and to be transmitted to the Secretary of State of the United States, and other like copies thereof to be made and to be transmitted to the presiding officers of the two houses of Congress.

I hereby certify that the foregoing is a true copy of a concurrent resolution of the general assembly of the State of Rhode Island, passed on the 7th day of February, 1867. In testimony whereof, I, Ambrose E. Burnside, governor of the State of Rhode Island, have hereto subscribed my name and affixed the seal of said State, this thirteenth day of February, A. D. 1867.

[SEAL.]

A. E. BURNSIDE,
Governor of Rhode Island.

By the Governor:

JOHN R. BARTLETT,
Secretary of State.

THOMAS vs. ARNELL.

PAPERS

IN THE

CASE OF THOMAS VS. ARNELL,

IN THE

Sixth congressional district of Tennessee.

FEBRUARY 20, 1867.—Referred to the Committee on Elections and ordered to be printed.

NASHVILLE, TENNESSEE, *January 24, 1867.*

You are hereby notified that, in a contest now pending in the House of Representatives of the Thirty-ninth Congress of the United States, wherein you are the sitting member and I the contestant, from the sixth congressional district of the State of Tennessee, composed of the counties of Lawrence, Wayne, Hardin, Decatur, Perry, Lewis, Maury, Hickman, Humphreys, Dickson, Montgomery, and Stewart, I shall rely upon the following facts and testimony in the presentation and prosecution of my claims, to wit :

1. That, at a regular election, opened and held in accordance with the laws of Tennessee and of the United States on the 3d day of August, 1865, in the sixth congressional district of said State, composed of the above-named counties, I received a majority of four hundred and ninety-six (496) votes, as shown by a certified copy of the official returns, regular in form, and now on file in the office of the secretary of state of the State of Tennessee.

2. That at said election, without including the vote of the county of Decatur, I received a majority of four hundred and fifty-six (456) votes.

3. That at said election I received a majority of all the votes polled, and that said election was held in accordance with the provisions of the laws of Tennessee and of the United States.

In proof of the above allegations I shall present a certified copy of the election returns of said district and counties, now on file in the office of the secretary of state of the State of Tennessee.

D. B. THOMAS.

Hon. SAMUEL M. ARNELL.

JANUARY 29, 1867.

I acknowledge the service of the within notice.

S. M. ARNELL.

UNITED STATES OF AMERICA,

House of Representatives of the Congress of the United States, ss :

In the matter of the contest of Dorsey B. Thomas, contesting the seat of Samuel M. Arnell, the sitting member from the sixth congressional district of Tennessee.

Answer of Samuel M. Arnell.

The answer of Samuel M. Arnell, the sitting member of Congress from the sixth congressional district of the State of Tennessee, to the notice of contest of Dorsey B. Thomas, and to the several points and propositions made by the said Dorsey B. Thomas, in support of his said contest of said seat in the House of Representatives and claim thereto, respectfully shows, and makes issue and response thereto as follows :

First. That said respondent, Arnell, denies "that at a regular election, opened and held in accordance with the laws of Tennessee and of the United States, on the 3d day of August, 1865, in the sixth congressional district of said State, the said Dorsey B. Thomas received a majority of four hundred and ninety-six (496) votes, as shown by a certified copy of the official returns, regular in form, and now on file in the office of the secretary of state of the State of Tennessee," as alleged in the first specification relied upon by said contestant, Dorsey B. Thomas.

Second. That said respondent, Arnell, denies "that at said election, without including the vote of the county of Decatur, the said Dorsey B. Thomas received a majority of four hundred and fifty-six (456) votes," as alleged in the second specification relied upon by the said contestant, Dorsey B. Thomas.

Third. That said respondent, Arnell, denies "that at said election the said Dorsey B. Thomas received a majority of all the votes polled, and that said election was held in accordance with the provisions of the laws of Tennessee and of the United States," as alleged in the third specification relied upon by said contestant, Dorsey B. Thomas.

And said respondent, Arnell, after having denied specifically the allegations of said contestant, Dorsey B. Thomas, as particularly set forth in his notice of contest, further says that, at said election for congressman and representative from the sixth congressional district of Tennessee, held on the 3d day of August, 1865, he, the said Arnell, received a majority of the qualified voters of the sixth congressional district of Tennessee, to the extent of seven hundred and ninety-one (791) votes, without calculating the votes of Perry, Lewis, and Decatur counties, upon the aggregate votes of which counties he, the said Arnell, received a further majority of, at least, one hundred and seventy (170) votes, which, added to the majority of seven hundred and ninety-one (791) votes, makes the majority for said respondent, Arnell, over said contestant, Thomas, of the legal qualified voters of said sixth congressional district of Tennessee, of nine hundred and sixty-one (961) votes, and a majority of all the votes legally polled.

Wherefore said respondent, Arnell, says that he was duly and legally elected member of Congress and representative from the sixth congressional district of Tennessee, over and above all other persons, by a large majority of the legal voters thereof, to wit, by nine hundred and sixty-one (961) votes, and as such is entitled to hold his seat as such sitting member.

And of the contest of said Dorsey B. Thomas, he, the said Arnell, respondent and sitting member of Congress from the sixth congressional district of Tennessee, demands proof of the several specifications made and relied upon by said contestant, Dorsey B. Thomas, and demands that he, the said respondent, may make all proof *contra*, to fully show that the certificate of his election, awarded by his excellency W. G. Brownlow, governor of the State of Tennessee, was made in accordance with existing laws of the State of Tennessee and of the United States, and was legally, justly, and rightfully given by said Governor Brownlow to him, the said respondent and sitting member.

Dated February 4, 1867.

SAMUEL M. ARNELL,
Sitting Member of Sixth Congressional District.

*Statement of votes polled in 6th Congressional district for member of Congress,
August 3, 1865.*

Names of counties.	D. B. Thomas.	S. M. Arnell.	Collier.
Lawrence.....	101	335	....
Wayne.....	74	479	....
Hardin.....	83	488	....
Decatur.....	183	153	....
Perry.....	6	153	....
Lewis.....	3	59	....
Maury.....	628	414	....
Hickman.....	108	143	....
Humphreys.....	391	1	....
Dickson.....	247	147	1
Montgomery.....	437	49	....
Stewart.....	727	5	....
5th Tennessee cavalry.....		11	....
6th Tennessee cavalry.....		64	....
7th Tennessee cavalry.....		2	....
Total.....	2,988	2,502	1

We, the judges and clerks of election, held at headquarters fifth regiment Tennessee volunteer cavalry, in Lincoln county, Tennessee, on the third day of August, 1865, for members of Congress and representatives to the State legislature, in conformity with instructions from governor of Tennessee, do certify that the total number of votes polled was one hundred and sixty-three (163.)

Of which William B. Stokes, candidate for Congress from the third district, received 103 votes; Asa Faulkner, candidate for Congress from the third district, received one vote; Edward Cooper, candidate for Congress from the fourth district, received one vote; James Mullins, candidate for Congress from the fourth district, received eighteen votes; Samuel J. Carter, candidate for Congress from the fifth district, received twenty-five votes; and William B. Campbell, candidate for Congress from the fifth district, received one vote; Samuel Arnell, candidate for Congress from the sixth district, received eleven votes; W. H. Wisener, candidate for Congress from the fourth district, received one vote.

FRANCIS M. CUBBINS,
JOHN B. TURNER,
J. K. RIGSBY,

Judges.

ARTHUR MAGUIRE,
TURNER L. WOOD,

Clerks.

Tally list of votes polled at an election held at Exchange barracks, for members of Congress for the seventh congressional district of Tennessee, on the 3d of August, 1865, the voters being members of the seventh Tennessee cavalry volunteers.

Hawkins, two hundred and six votes; Etheridge, no votes; Arnell, sixth district, two votes.

The undersigned, judges and clerks of an election held as aforesaid, do certify that the foregoing is a correct poll-book and tally list of said election.

E. ARBUCKLE,
BENJAMIN F. GREER,
PLEASANT K. PARSONS,

Judges.

J. N. TEAGUE,
JOHN M. ROWE,
Clerks.

For Congress—Ed. Cooper, 2 ; Sam. Arnell, 64 ; J. R. Hawkins, 72 ; R. S. Saunders, 47.

For senator 21st district—James Warren, 61.

We, the undersigned, clerks and judges of an election opened and held in the Exchange barracks, at Nashville, Tennessee, for the 6th Tennessee cavalry, for members of Congress and senator in the 21st senatorial district, by virtue of a commission issued by his excellency W. G. Brownlow, governor, to W. J. Smith, colonel 6th Tennessee cavalry, do certify that the above list is a correct poll of votes at said election.

W. A. GRANT,
O. H. SHEARER,
JAMES L. W. BOATMAN,

Judges.

S. L. WARREN,
W. A. NEWSOM,
Clerks.

STATE OF TENNESSEE, *Perry county :*

I, John L. Webb, sheriff of said county, do certify that I caused to be opened and held an election in said county on the first Thursday in August, 1865, for members to Congress. Arnell received one hundred and fifty-three (153) votes ; Thomas received six (6) votes.

— — —, *Sheriff.*

AUGUST 6, 1865.

STATE OF TENNESSEE, *Lawrence County :*

I, A. M. Harrison, sheriff of the county, State aforesaid, do hereby certify that at a popular election held according to law at all the election grounds in said county, (except two, at which a sufficient number of persons did not attend to hold an election,) on the 3d day of August, 1865, for the purpose of electing a member to Congress from the 6th congressional district of Tennessee, Samuel M. Arnell received three hundred and thirty-five votes, and D. B. Thomas one hundred and one votes.

A. M. HARRISON, *Sheriff.*

AUGUST 7, 1865.

I do certify that at a popular election held in Lewis county, according to law, on the 3d day of August, 1865, for a member to Congress, Samuel Arnell received fifty-nine (59) votes, and Thomas received three (3) votes.

M. D. BROWN, *Sheriff.*

AUGUST 4, 1865.

STATE OF TENNESSEE, *Maury county :*

I, William M. Sullivan, sheriff of Maury county, do hereby certify that at an election began and held at the different precincts in my county on the 3d day of August, 1865, for representative for the 6th congressional district of Tennessee in the Congress of the United States, all the judges and clerks being

sworn according to the seventh section of the franchise act of 1865, that after comparing all the votes polled at said election I find that D. B. Thomas has received six hundred and twenty-eight (628) votes, and S. M. Arnell received four hundred and fourteen (414) votes.

Given under my hand at the sheriff's office, this 5th day of August, 1865.

WILLIAM M. SULLIVAN,

Sheriff Maury County.

STATE OF TENNESSEE, *Hickman County*:

I, Joseph Beasley, sheriff of the county of Hickman, State of Tennessee, hereby certify that I caused to be held an election in the various civil districts of said county, to elect a member to Congress, on Thursday, the 3d day of August, 1865, and the following is the result of the votes polled in my said county, to wit:

S. M. Arnell received one hundred and forty-three votes; D. B. Thomas received one hundred and eight votes.

Witness my hand of office this the 7th day of August, 1865.

JOSEPH BEASLEY, *Sheriff.*

CLARKSVILLE, MONTGOMERY COUNTY, TENNESSEE,

August 8, 1865.

I certify that at an election held on Thursday, the 3d day of August, 1865, for the purpose of electing a representative for the sixth congressional district, the full returns from each civil district in the county have been carefully examined by me, which show:

D. B. Thomas received four hundred and thirty-seven votes, and that S. M. Arnell received forty-nine votes.

I have forwarded to Governor W. G. Brownlow a duplicate of this certificate, and have deposited with the county court clerk the different poll-books, and a triplicate of this certificate.

BERRY LYLE,

Sheriff, Montgomery County.

By O. M. BLACKMAN,

Deputy Sheriff, Montgomery County.

A. J. FLETCHER, Esq.,

Secretary of State, Nashville, Tennessee.

The sheriff of Dickson county, State of Tennessee, has returned a copy of the poll-books of the respective districts of said county, all of which have been properly certified by him, and are as follows:

1st district, Arnell	29 ;	Thomas	4
2d district, Arnell	18 ;	Thomas	13
3d district, Arnell	2 ;	Thomas	12
4th district, Arnell	1 ;	Thomas	21
5th district, Arnell	0 ;	Thomas	17
6th district, Arnell	19 ;	Thomas	91
6th district, Collier 3 votes.			
7th district, Arnell	7 ;	Thomas	34
8th district, Arnell	16 ;	Thomas	12
9th district, Arnell	19 ;	Thomas	6
10th district, Arnell	0 ;	Thomas	20
11th district, Arnell	10 ;	Thomas	8
12th district, Arnell	26 ;	Thomas	9
Total	147	.....	247

STATE OF TENNESSEE, *Wayne county* :

This is to certify that at a popular election held by me in Wayne county, on the first Thursday, it being the 3d day of August, 1865, for a member to the Congress of the United States; the following was the result :

For S. M. Arnell.....	479 votes.
For D. B. Thomas.....	74 votes.
For Moody	1 vote.

I hereby certify that the above is a correct list of all the votes polled in said county this 7th day of August, 1865.

JOHN GRIMES, *Sheriff*.

STATE OF TENNESSEE, *Hardin county* :

I do hereby certify that at a popular election held, according to law, at the respective election grounds in all the districts in the county of Hardin, and State of Tennessee, on the 3d day of August, 1865, for members to Congress, that S. M. Arnell received 488 votes, and D. B. Thomas received 83 votes.

This 7th August, 1865.

N. M. D. KEMP,
Sheriff of Hardin county.

I certify that at a popular election held according to law, in the respective election grounds in all the districts in Stewart county, State of Tennessee, on the 3d day of August, 1865, for member to Congress, that D. B. Thomas received seven hundred and twenty-seven (727) votes, Arnell received five (5) votes; that M. Brandon received, for representative for Stewart county, five hundred and ninety-nine (599) votes; that Barnett Crockerell received one hundred and nineteen (119) votes; that Jesse Glasgow received four (4) votes.

This the 4th August, 1865.

W. T. KEELL, *Sheriff*.

STATE OF TENNESSEE, *Humphreys county* :

I, M. M. Massey, sheriff of said county, do hereby certify that the following is a true account of an election as returned to me, began and held on the 3d day of August, 1865, in the several precincts of said county, for the purpose of electing one representative to represent the 6th congressional district of the State of Tennessee in the Congress of the United States :

Samuel M. Arnell received one (1) vote, D. B. Thomas received three hundred and ninety-one (391) votes.

Given under my hand at Waverly.

M. M. MASSEY,
Sheriff of Humphreys County.

STATE OF TENNESSEE, *Decatur county* :

I, J. C. Roberts, clerk of the county court of Decatur county, do hereby certify that from the poll-books of the different precincts of this county of an election opened and held on the 3d day of August, 1865, as returned by the sheriff of said county, for member to the Congress of the United States from the sixth congressional district of Tennessee, that there were polled for S. Arnell one hundred and fifty-three (153) votes, and for D. B. Thomas one hundred and eighty-three (183) votes. Given under my hand and seal this the 16th day of December, 1865.

J. C. ROBERTS,
Clerk of County Court.

'To which is appended the seal of the county.

I, Andrew J. Fletcher, secretary of state of the State of Tennessee, do hereby certify that the foregoing are true copies of the original returns of the sheriffs of the counties composing the 6th congressional district of the State of Tennessee of an election for representative in Congress, held on the 3d day of August, 1865. In testimony whereof, I have hereunto subscribed my official signature, and, by order of the governor, affixed the great seal of the State of Tennessee, at the department, in the city of Nashville, the 21st day of December, 1865.

[SEAL.]

A. J. FLETCHER,
Secretary State.

PROCLAMATION BY THE GOVERNOR.

STATE OF TENNESSEE, EXECUTIVE DEPARTMENT,
Nashville, June 12, 1865.

Whereas the State of Tennessee has long been without a representation in the Congress of the United States, and has had only a partial representation since the beginning of the war; and whereas the loyal people of the State have, at the ballot-box and in many other ways, expressed their desire to discharge their duties as citizens of the United States of America, and did, on the 4th day of March, 1865, choose and elect a legislature of the State, who have duly assembled under the constitution and laws of the State, and have fully reorganized the State government, and have elected two senators to the Congress of the United States, and have, by their act of June 9, 1865, apportioned the representation of the State in the Congress of the United States; therefore, I, William G. Brownlow, governor of the State of Tennessee, do hereby command the sheriffs or coroners of the several counties of the State of Tennessee to open and hold an election at all the places of holding elections in their respective counties, on Thursday, the third day of August next, for the purpose of electing representatives in the Congress of the United States, according to the provisions of the said act of June 9, 1865; and whereas, since the election of the present general assembly, the following vacancies have occurred in the representation thereof, viz.:

In the senatorial district composed of the counties of Johnson, Carter, Washington, and Sullivan, caused by the resignation of the Hon. R. R. Butler;

In the senatorial district composed of the counties of Knox and Roane, caused by the resignation of the Hon. Samuel R. Rogers;

In the senatorial district composed of the counties of Bedford and Marshall, caused by the resignation of the Hon. W. H. Wisener;

In the senatorial district composed of the counties of Hardin, McNairy, and Hardeman, caused by the resignation of the Hon. Fielding Hurst;

In the house of representatives, from the county of Giles, caused by the resignation of the Hon. James R. Dillen;

From the county of Stewart, caused by the resignation of the Hon. James Woods;

From the county of Henry, caused by the non-acceptance of the Hon. Thomas Crutchfield;

From the counties of Lincoln, Marshall, and Giles, caused by the non-acceptance of the Hon. David McGahey; therefore the sheriffs or coroners of the several counties in which said vacancies exist shall open and hold said election for the purpose of filling the vacancies existing in the representation of said several counties.

And whereas the general assembly, on the 5th day of June, 1865, passed "An act to limit the elective franchise," which is hereto annexed, and made a

part of this proclamation, the said sheriffs and the judges of said elections, and all others, are hereby strictly enjoined to enforce the provisions and restrictions declared in said act, and to require that every voter shall be qualified to vote according to the same; and whereas the said act provides, "that it shall be the duty of the county court clerk in each county to open and keep a registration of voters, before whom proof, under oath, shall be made that the voter falls within the provisions of said act;" said county court clerks are hereby commanded, without delay, to procure a bound book, or books, for each county, and to open and keep the same as a registration of voters of said county, and shall furnish to such persons as may fall within the provisions of said act a certificate of registration, and no person shall be permitted to vote at said election without such certificate.

The following form of certificates of registration is respectfully recommended :

STATE OF TENNESSEE, *County of* ———, ss :

I, A. B., clerk of the county court of said county, do hereby certify that proof under oath has been made before me, that C. D. falls within the provisions of section 1, of an act entitled, "An act to limit the elective franchise," passed June 5, 1865, and is therefore a qualified voter of said county.

Given under my hand at the office, the day of ———, 1865.

A. B., *Clerk.*

In testimony whereof I have hereunto subscribed my name, and caused the great seal of the State to be affixed at the department of Nashville, this 13th day of June, 1865.

By the governor :

[SEAL.]

W. G. BROWNLOW.

A. J. FLETCHER, *Secretary of State.*

The Nashville Press and Times, Nashville Union, Memphis Argus, Memphis Bulletin, Chattanooga Gazette, Knoxville Whig, and Jonesboro' Flag of the Union, will publish this proclamation and the "Act to limit the elective franchise," once per week until the election, and forward accounts to the secretary of state for approval.

A. J. FLETCHER,
Secretary of State.

An act to limit the elective franchise.

Whereas the first article and the first section of the declaration of rights in the constitution of the State of Tennessee declares :

"That all power is inherent in the people, and all free governments are founded on their authority, and instituted for their peace, safety and happiness; for the advancement of these ends they have at all times an inalienable and indefeasible right to alter, reform, or abolish the government in such manner as they may think proper;" and

Whereas a large and respectable convention of the free and loyal people of the State of Tennessee, met in the city of Nashville on the 9th day of January, 1865, and proposed certain alterations and amendments to the constitution of the State of Tennessee, for rejection or ratification by the loyal people on the 22d of February following; and whereas said amendments and schedule were solemnly ratified with great unanimity by the authoritative voice of the people; and whereas the 8th section of said schedule provided for the election of a governor and members of the legislature on the 4th day of March, 1865, and who, in accordance therewith, were elected by the ballots of the loyal people; and whereas the same authoritative voice in section 9th of the schedule delegated to the general assembly meeting first under this amended constitution the right to fix the qualification of voters, and the limitation of the elective

franchise ; therefore, acting faithfully under and in accordance with this delegation of supreme power :

SEC. 1. *Be it enacted by the general assembly of the State of Tennessee,* That the following persons, to wit :

1. Every white man twenty-one years of age, a citizen of the United States, and a citizen of the county wherein he may offer his vote six months next preceding the day of election, and publicly known to have entertained unconditional Union sentiments from the outbreak of the rebellion until the present time ; and

2. Every white man, a citizen of the United States, and a citizen of the county wherein he may offer his vote six months next preceding the day of election, having arrived at the age of twenty-one years since March 4, 1865, *provided* he has not been engaged in armed rebellion against the authority of the United States, voluntarily ; and

3. Every white man of lawful age, coming from another State, and being a citizen of the United States, on proof of loyalty to the United States, and being a citizen of the county wherein he may offer his vote six months next preceding the day of election ; and

4. Every white man, a citizen of the United States, and a citizen of this State, who has served as a soldier in the army of the United States, and has been or may be hereafter honorably discharged therefrom ; and

5. Every white man of lawful age, a citizen of the United States, and a citizen of the county wherein he may offer his vote six months next preceding the day of election, who was conscripted by force into the so-called confederate army, and was known to be a Union man, on proof of loyalty to the United States, established by the testimony of two voters under the previous clauses of this section ; and

6. Every white man who voted in this State at the presidential election in November, 1864, or voted on the 22d February, 1865, or voted on the 4th March, 1865, in this State, and all others who had taken the "oath of allegiance" to the United States, and may be known by the judges of election to have been true friends to the government of the United States, and would have voted in said previously mentioned elections if the same had been holden within their reach, shall be entitled to the privileges of the elective franchise.

SEC. 2. *Be it further enacted,* That all persons who are or shall have been civil or diplomatic officers or agents of the so-called confederate States of America, or who have judicial stations under the United States, or the State of Tennessee, to aid in any way the existing or recent rebellion against the authority of the United States, or who are or shall have been military or naval officers of the so-called confederate States above the rank of captain in the army or lieutenant in the navy, or who have left seats in the United States Congress, or seats in the legislature of the State of Tennessee, to aid said rebellion, or have resigned commissions in the army or navy of the United States, and afterwards have voluntarily given aid to said rebellion, or persons who have engaged in treating otherwise than lawfully as prisoners of war persons found in the United States service, as officers, soldiers, seamen, or in any other capacities, or persons who have been or are absentees from the United States for the purpose of aiding the rebellion, or persons who held pretended offices under the government of States in insurrection against the United States, or persons who left their homes, within the jurisdiction and protection of the United States, or fled before the approach of the national forces, and passed beyond the federal military lines into the so-called confederate States, for the purpose of aiding the rebellion, shall be denied and refused the privilege of the elective franchise in the State for the term of fifteen years, from and after the passage of this act.

SEC. 3. *Be it further enacted,* That all other persons, except those mentioned in section one of this act, are hereby and henceforth excluded and denied the

exercise of the privilege of the elective franchise in this State for the term of five years from and after the passage of this act.

SEC. 4. *Be it further enacted*, That all persons embraced in section three of this act, after the expiration of said five years, may be readmitted to the privilege of the elective franchise by petition to the circuit or chancery court or proof of loyalty to the United States, in open court, upon the testimony of two or more loyal citizens of the United States.

SEC. 5. *Be it further enacted*, That so long as any of the white citizens of the State of Tennessee, who by this act are entitled to exercise the elective franchise, shall be connected with the army of the United States, or with the military force of this State in actual service, the governor shall issue writs of election to the commanding officers of such brigades, regiments, or detachments of Tennessee soldiers, wherever located, who shall open and hold the election, and receive the votes of their respective commands, and return the same to the secretary of state, and which shall be counted in the same way and manner as if said votes had been cast in any of the counties of the State to which the soldiers belonged.

SEC. 6. *Be it further enacted*, That it shall be the duty of the county court clerk in each county to open and keep a registration of votes, and before whom proof, under oath, that the voter falls within the provisions of article one of this act shall be made: *Provided*, No man of publicly known union sentiments shall be required to make oath in doing the same; and said clerk shall receive such compensation as the county court in each county may deem proper; and also said clerk shall issue to all such persons a certificate of registration, and no one shall be permitted by the judges of elections to vote unless so registered.

SEC. 7. *Be it further enacted*, That any voter may be challenged by an admitted voter of section one of this act on offering his vote, and thereupon the judges of elections shall peremptorily administer to the person so challenged, before permitting him to vote, the following oath; said oath also to be taken by all judges of elections and candidates for office:

OATH.

I do solemnly swear that I will henceforth support the Constitution of the United States and defend it against the assaults of all its enemies; that I am an active friend of the government of the United States; that I will heartily aid and assist the loyal people in whatever measures may be adopted, under the Constitution of the United States, and under all laws and proclamations made in pursuance thereof, to establish the national authority over all the people of every State and Territory embraced in the national Union; and that I will faithfully and most heartily support and defend the constitution of the State of Tennessee and the amendments and schedule thereunto appended and adopted by the people on 22d day of February, 1865; and also all acts of the general assembly assembled in accordance therewith; and that I take this oath freely, voluntarily, and without mental reservation, so help me God.

SEC. 8. *Be it further enacted*, That any person taking this oath falsely shall be guilty of perjury, and shall suffer the pains and penalties attached to that crime.

SEC. 9. *Be it further enacted*, That the power is reserved to alter, amend, or change the provisions of this act at any time when, in the opinion of this general assembly of the State, it is right and proper to do so.

SEC. 10. *Be it further enacted*, That this act shall take effect from and after its passage.

Passed June 5, 1865.

WM. HEISKELL,
Speaker of the House of Representatives.
S. R. RODGERS,
Speaker of the Senate.

ADDRESS TO THE PEOPLE OF TENNESSEE.

FELLOW CITIZENS: Called to the chief magistracy of the State, without my own seeking, by the unanimous nomination of a great convention, and almost unanimous election by the loyal people; entering upon the discharge of my duties nearly simultaneously with the fall of the rebellion, I fondly hoped that the whole people, wearied with war, desolation, and anarchy, would hail with delight and upport with alacrity the coming of civil government and the inauguration of law and order—that a patriotic people would leave me, like my predecessors of other days, with little to do but to witness and encourage the cultivation of the soil, the pursuits of commerce and the arts, and the redress of grievances by the courts.

But I am pained to announce my serious apprehensions that a different order of things is soon to be encountered. The harangues of aspiring politicians denouncing the termination of slavery, the establishment of a free State constitution, and the very existence of the government over which I am called to preside as unconstitutional, spurious, and a usurpation—the conduct of numerous county officers in evading or failing to perform their duties, the holding of numerous local elections in defiance of law, and the instalment into office of disfranchised rebels, proclaim too plainly to be misunderstood that the spirit of rebellion and nullification still exists *and must be met and defeated*.

In order that all who desire may understand the basis and true foundation of the present constitution and government of Tennessee, I propose, in a few plain words, to show its validity and constitutionality.

The Constitution of the United States declares that “the United States shall guarantee to every State in this Union a republican form of government.” The government of Tennessee was usurped by a military despotism, resulting in anarchy and a reign of terror. Our noble and glorious national government determined, at the cost of many thousand lives and many millions of money, to perform its duty by guaranteeing to us a free government. Both military and civic measures had to be brought into requisition. The military performed its duty in blood on the field of battle. But it appointed a civilian, in the person of the present honored Chief Magistrate of the nation, to carry out such civil policy as was found necessary to execute in good faith its guaranty to the people. After over three years of patient toil his labors resulted in the establishment of the government now in power, which is so fiercely denounced. It is his workmanship—the fruit of his mind, acting under national authority, and proudly proclaimed by him “the supreme law of the State of Tennessee,” and from his heart he “congratulated the people on the happy result.” Does any suppose he will not stand by it and maintain it with the force of the nation? Strange to say there are those who, not understanding the man or his duty, declare that he will not sustain it, but will set it aside and not allow its legislature to meet again. It may be some relief to the friends of the new government to be assured that most of those who so claim to represent the President are men in whose honesty he never had any confidence. The President will sustain his model scheme of reconstructing the government of the rebellious States, and that with just so much force, applied in just such manner as may be necessary.

When the nation entered upon its task of furnishing the people of Tennessee with a republican form of government, it had a right to present just such particular form of free government as was most adapted to the condition of the people, and to choose the means of setting the government on foot. If it had chosen the constitution of Kentucky or of Maine it is difficult to see what objection could have been made on constitutional grounds. But in deference to the tastes and habits of our people it chose our own constitution, divested only of that feature which had caused all our sufferings, and proceeded to present us with our own abandoned ship of state, clothed in its ancient rigging. It is

not for us to say there were irregularities in the mode or time of setting the State government in motion. It was for the national power in performing its guarantee to choose for itself the manner and the time of discharging its duty. It chose to revive the State government through the loyal people of the State,—those who had not proved themselves unworthy of free government. It prescribed through its agent its own plan of operations, and had a right to do so. The State government is thus the gift of the nation, and is certainly a compliance with the obligation in the constitution to guarantee to us a republican form of government.

With this general statement I might conclude, but I feel called upon to meet, specifically, the complaints of those who affect to be aggrieved.

It is said the convention of January last was self-constituted and irresponsible, and assumed to amend the constitution. The convention was the initiatory means chosen by the national administration, through its civil agent. The people of Tennessee had no right to prescribe to the general government what should be its first step toward a republican form of government for the State. The convention consisted of over five hundred delegates; if it had been but five, or one, or if Governor Johnson himself had sat down in his office and drawn up a form of government, and by authority of the nation had proclaimed it to the people it would have been all the same—a national act.

It is said the amendment and schedule were submitted to only a part of the people, and was therefore partial and unfair.

It may well be questioned whether the national authority was under any constitutional obligation to submit it to a vote at all, its business being to place over us a republican form of government, choosing itself the means and the channel of transmitting it to us. It was submitted to a vote of the loyal people. And why submit it to the disloyal who were in arms and in the field fighting to destroy the nation itself. But this, too, was a national act in which we were strictly entitled to take no part.

Again, it is said that the State government was forced upon the people. Certainly, it was forced upon the rebellious majority of the State. So was the authority of the United States forced upon them, and at the point of the bayonet; and just so the nation had a right to force upon them a republican form of government, for nothing but force was recognized by them.

The next cause of complaint, and that which is now endangering the peace of the State, is that the legislature has passed and the governor is trying to enforce "An act to limit the elective franchise." Serious and alarming as the question is, there are just two classes of persons who object to it, viz: Rebels and those who want rebel votes. Loyal men are never heard to complain of it.

It is said this law is unconstitutional. This is impossible, as the law is part of the constitution itself.

The federal government, by its agent, Governor Johnson, through the convention and the ratification of the people, conferred upon the first general assembly that should convene the power to limit the qualification of voters. The qualification of voters is prescribed by the constitution. The convention proposed that the legislature might amend the constitution in this particular, and the people ratified the proposition. Thus the power of amendment was *delegated* to the legislature, which became, while acting upon this subject, to all intents and purposes a constitutional convention. The power of the convention to delegate this authority was legitimate and beyond question, by being the chosen instrument of the federal government, whose authority was supreme.

Finally, it is said the law is harsh and wanting in magnanimity. By law, the crime of the disfranchised is treason, and the punishment death and confiscation of property. All this is waived and it is said to be cruel to refuse them the privilege of voting for a few years. Magnanimity requires that they should go to the ballot box and with bloody hands deposit their ballots, and by force

of numbers seize the reins of the government they have tried to destroy—elevate their baffled leaders to power, renew their persecutions of Union men, and at last have the victory in the State. East Tennessee, with her thousand martyrs to remember, is again to come under the rule of such men as Harris, or Cheatham, or Bates, or Pillow, a mere appendage to a rebel State!—a province to a rebel government! And yet this will be the early result of the repeal or failure of the “Act to limit the elective franchise.”

Having said this much by way of friendly explanation, I come to the principal object of this address, and that is, that this important law is already set at naught in many localities by the evasion of those whose official duty it is to execute it, and to announce that it will be enforced on the day of election as far as the civil *and military* authorities can enforce it. And all elections effected by illegal votes will be annulled, and, if necessary, the officers elected will be arrested. The civil and military authorities understand each other and will act in harmony. The commander of the military division of Tennessee will aid the civil authorities in all instances where the powers of the latter are inadequate. To protect the ballot box from fraudulent voting, or to remove the county officers in one-half the State when elected, judicial proceedings will be utterly impracticable and the civil remedy wholly inadequate. The military will assist in this particular. This step, so likely to become necessary, is much to be regretted, and the clerks and judges of election yet have time to correct much they have done, and the hope is expressed that many of them will do so, and save their respective counties from military intervention.

It is my sincere desire that the entire State be represented in the next Congress. If the election in Middle and West Tennessee proves a failure, it will not be my fault. I have issued two proclamations, and now this address, warning the people against an illegal election. If they will persist in it, they must go without representation in the councils of the nation.

With a sincere hope that the present cloud may pass away, and that quiet and contentment may yet come to our suffering people, I remain your servant,
W. G. BROWNLOW.

KNOXVILLE, *July 12, 1865.*

PROCLAMATION BY THE GOVERNOR.

STATE OF TENNESSEE, EXECUTIVE DEPARTMENT,
Nashville, July 10, 1865.

Whereas it has been made known to me that in many parts of Middle and Western Tennessee those who have been lately in rebellion against the United States, with their friends and sympathizers, and with hands yet red with the blood of our loyal people, are either openly defying, or indirectly setting at naught, an important law of the land; and whereas it is made the duty of the governor, by the constitution and his oath of office, “to take care that the laws be faithfully executed:”

Therefore, I, William G. Brownlow, governor of the State of Tennessee, do proclaim that the act of the general assembly passed on the 5th day of June, 1865, entitled “An act to limit the elective franchise,” having been deliberately passed under an express authority delegated to said general assembly by the convention of the 9th of January last, which delegation of power was solemnly ratified by the people at the ballot-box, and proclaimed by the military governor on behalf of the United States as the organic law—is the supreme law of the land, and will be rigidly enforced; and all who shall band themselves together for the purpose of defeating the execution of said law, will be declared in rebellion against the State of Tennessee, and dealt with as rebels.

And I do proclaim that no person is entitled to vote at any election by the people of this State unless he shall first actually prove by testimony under oath that he comes within the provisions of the first section of said law; and shall obtain a certificate of registration as prescribed in said law, upon such proof in fact made. And that the votes of all persons and all counties, contrary to the strict provisions of this law, will be thrown out, and will not be taken into account in the office of the secretary of state.

And I do further proclaim that said law requires that every candidate for office shall take the oath prescribed by the seventh section of said act; and no person is or can be a candidate until he shall have properly taken and subscribed said oath; and I do declare that any person pretending to be a candidate for Congress, or other office, who shall fail to take and subscribe said oath, and file on the same in the office of the secretary of state, or before the third day of August next, will not be treated as a candidate, and all votes for such person will not be taken into account.

And I call upon the civil authorities throughout the State to arrest and bring to justice all persons who, under pretence of being candidates for Congress, or other office, are travelling over the State denouncing and nullifying the constitution and laws of the land, and spreading sedition and a spirit of rebellion.

I also command all clerks of the county courts and judges of elections faithfully and strictly to perform and not evade the responsible trust confided to them by said law; and I solemnly warn them that they will be held to a strict account for any failure in this respect.

In testimony whereof I have hereunto subscribed my name and caused the great seal of the State to be affixed, at the department in Nashville,
[SEAL.] this 10th day of July, A. D. 1865.

WILLIAM G. BROWNLOW.

By the governor:

A. J. FLETCHER,
Secretary of State.

WASHINGTON, *July 20, 1865.*

I hope, and have no doubt, you will see that the recent amendments to the constitution of the State as adopted by the people, and all laws passed by the last legislature in pursuance thereof, are faithfully and fairly executed, and that all illegal votes in the approaching election be excluded from the polls, and the election for members of Congress be legally and fairly conducted. When and wherever it becomes necessary to employ force for the execution of the laws and the protection of the ballot-box from violence and from fraud, you are authorized to call upon Major General Thomas for sufficient force to sustain the civil authorities of the State. I have received your recent address to the people and think it well timed, and hope it will do much good in reconciling the opposition to the amendment of the constitution and the laws passed by the last legislature. The law must be executed and the civil authority sustained. In your efforts to do this, if necessary, General Thomas will afford a sufficient military force. You are at liberty to make what use you think proper of this despatch.

ANDREW JOHNSON,
President of the United States.

Hon. W. G. BROWNLOW.

A true copy of despatch received by me.

W. G. BROWNLOW,
Governor of State of Tennessee.

Official returns of the sheriff in the counties composing the sixth congressional district of the State of Tennessee, of an election for representative from said district in the Congress of the United States, held August 3, 1865.

STATE OF TENNESSEE, *Lawrence county* :

I, A. M. Harrison, sheriff of the county and State aforesaid, do hereby certify that at a popular election held according to law at all the election grounds in said county, except two, at which a sufficient number of persons did not attend to hold an election, on the 3d day of August, 1865, for the purpose of electing a member to Congress from the sixth congressional district of Tennessee, Samuel M. Arnell received three hundred and thirty-five votes, and D. B. Thomas one hundred and one votes. This August 7, 1865.

A. M. HARRISON, *Sheriff*.

STATE OF TENNESSEE, *Wayne county* :

This is to certify that at a popular election held by me in Wayne county on the first Thursday, it being the 3d day of August, 1865, for a member to the Congress of the United States, the following was the result : For S. M. Arnell, four hundred and seventy-nine votes ; D. B. Thomas, seventy-four votes ; Moody, one vote. I certify that the above is a correct list of all the votes polled in said county. This 7th day of August, 1865.

JOHN GRIMES, *Sheriff*.

STATE OF TENNESSEE, *Hardin county* :

I do certify that at a popular election held according to law at the respective election grounds in all the civil districts in the county of Hardin and State of Tennessee, on the 3d day of August, 1865, for members of Congress, that A. M. Arnell received four hundred and eighty-eight votes, and D. B. Thomas received eighty-three votes. This 7th day of August, 1865.

N. M. D. KEMP,
Sheriff of Hardin county.

STATE OF TENNESSEE, *Perry county* :

I, John S. Webb, sheriff of said county, do certify that I caused to be opened and held an election in said county on the first Thursday in August, 1865, for members to Congress. Arnell received one hundred and fifty-three votes ; Thomas received six votes. August 6, 1865.

— — —, *Sheriff*.

I do certify that a popular election in Lewis county was held according to law on the 3d day of August, 1865, for a member to Congress ; Samuel Arnell fifty-seven votes, and Thomas five votes. This August 4, 1865.

M. D. BROWN,
Sheriff Lewis county.

STATE OF TENNESSEE, *Maury county* :

I, William M. Sullivan, sheriff of Maury county, do hereby certify that at an election began and held at the different precincts in my county, on the 3d day of August, 1865, for representative for the sixth congressional district of Tennessee in the next Congress of the United States, all the judges and clerks being sworn according to the 7th section of the franchise act of 1865, that after comparing all the votes polled in said election, I find that D. B. Thomas has received six hundred and twenty-eight votes, and S. M. Arnell four hundred and fourteen votes. Given under my hand at office, this 5th day of August, 1865.

WILLIAM M. SULLIVAN,
Sheriff Maury county.

STATE OF TENNESSEE, *Hickman county* :

I, Joseph Beasley, sheriff of the county of Hickman, of the State of Tennessee, hereby certify that I caused to be held an election in the various civil districts of said county to elect a member to Congress on Thursday the third day of August, 1865; and the following is the result of the vote polled in my said county, to wit: S. M. Arnell received one hundred and forty-three votes; D. B. Thomas received one hundred and eight votes.

Witness my hand at office, this seventh day of August, 1865.

JOSEPH BEASLEY, *Sheriff*.

STATE OF TENNESSEE, *Humphreys county* :

I, M. M. Massey, sheriff of said county, do hereby certify that the following is a true account of an election as returned to me, began and held on the third day of August, 1865, in the several precincts of said county, for the purpose of electing one representative to represent the sixth congressional district of the State of Tennessee in the Congress of the United States. Candidates' names: Samuel M. Arnell received one vote; D. B. Thomas received three hundred and ninety-one votes.

Given under my hand at Waverly,

M. M. MASSEY,
Sheriff Humphreys County.

The sheriff of Dickson county returns the original poll-books showing the following result :

	Arnell.	Thomas.	Collier.
First district.....	29	4	.....
Second district.....	18	13	.....
Third district.....	2	12	.....
Fourth district.....	1	21	.....
Fifth district.....	0	17	.....
Sixth district.....	19	91	1
Seventh district.....	7	34	.....
Eighth district.....	16	12	.....
Ninth district.....	19	6	.....
Tenth district.....	0	20	.....
Eleventh district.....	10	8	.....
Twelfth district.....	26	9	.....
	147	247	1

CLARKSVILLE, MONTGOMERY COUNTY, TENNESSEE,

August 7, 1865.

I certify that at an election held on Thursday the third day of August, 1865, for the purpose of electing a representative for the sixth congressional district Tennessee, the full returns for each civil district in this county have been carefully examined by me, which show that D. B. Thomas received 437 votes, and that S. M. Arnell received 49 votes.

BENJAMIN LYLE, *Sheriff*,
By O. M. BLACKMAN,
Deputy Sheriff, Montgomery County.

Governor W. G. BROWNLOW.

I certify that at a popular election held according to law in the respective election grounds in all the districts in Stewart county, State of Tennessee, on the third day of August, 1865, for member to Congress, that D. B. Thomas received seven hundred and twenty-seven (727) votes; that Arnell received five (5) votes; that N. Brandon for representative for Stewart county, received five hundred and thirty-nine votes; that Barnett Crockerell received one hundred and nineteen votes; that Jesse Glasgow received four (4) votes, this fourth day of August, 1865.

W. T. REEL, *Sheriff*.

The official returns of the fifth regiment Tennessee cavalry show the following result: S. M. Arnell, eleven votes; D. B. Thomas, none.

The official returns of the sixth Tennessee cavalry show the following result: S. M. Arnell, sixty-four (64) votes; D. B. Thomas, none.

The official returns of the seventh regiment Tennessee cavalry show the following result: S. M. Arnell, two (2) votes; D. B. Thomas, none.

The following is a tabular statement of the vote of the sixth congressional district, as copied from the books of the secretary of state:

Sixth Congressional District.

Counties.	Arnell, S. M.	Thomas, D. B.	Collier.
Lawrence.....	335	101	.....
Wayne.....	479	74	.....
Hardin.....	488	83	.....
Decatur.....	.....	.....	.....
Perry.....	153	6	.....
Lewis.....	59	3	.....
Maury.....	414	628	.....
Hickman.....	143	108	.....
Humphreys.....	1	391	.....
Dickson.....	149	247	1
Montgomery.....	49	437	.....
Stewart.....	5	727	.....
Fifth Tennessee cavalry.....	11	.....	.....
Sixth Tennessee cavalry.....	64	.....	.....
Seventh Tennessee cavalry.....	2	.....	.....
	2, 350	2, 805	1

STATE OF TENNESSEE, *County of Davidson, ss:*

William G. Brownlow, governor of the State of Tennessee, being duly sworn, deposes and says that he is governor of the State of Tennessee; that the papers hereto annexed, being printed matter, and marked Exhibit A and Exhibit B, are true and correct copies of my report to the general assembly of the State of Tennessee, and special message to the said general assembly. Exhibit A containing correct copies of the said report, and my several proclamations in reference to the subject-matter of said report. Exhibit B containing a special message in reference to violations of the franchise law and other public matters, of date

April 13, 1866. All of which I certify to be official, correct, and true, as therein more fully appears.

W. G. BROWNLOW.

Sworn to and subscribed before me, and reduced to writing in my presence, this 21st day of February, A. D. 1867.

N. A. PATTERSON,
Judge of Judicial Circuit of Tennessee.

EXHIBIT A.

EXECUTIVE DEPARTMENT,
Nashville, Tennessee, November 25, 1865.

Gentlemen of the general assembly :

In compliance with your joint resolution, adopted November 23, 1865, I have the honor to make the following report :

On the 10th of July last, seeing a general disposition to disregard the "act to limit the elective franchise," I issued my proclamation requiring a strict execution of the law, and announcing "that all the votes of all persons and counties contrary to the strict provisions of this law will be thrown out and not taken into account."

After the election, being assured that the law had "been in some counties erroneously construed, and in others wilfully evaded, and in some instances totally disregarded," I issued my proclamation calling upon the clerks and sheriffs and loyal citizens for information as to the manner in which voters had been registered and the election held. Copies of these proclamations are herewith presented.

Most of the clerks and sheriffs of the various counties of the State have responded to the inquiries made in the proclamation of August 11, and I regret to find I was not mistaken in my apprehensions that the law had been extensively misconstrued and disregarded.

Certificates of registration seem to have been obtained generally in five different modes :

First. Where the applicant was known to the clerk to be of publicly known Union sentiments.

Second. Upon proof by witnesses that the applicant came within the provisions of the "act to limit the elective franchise."

Third. Upon the oath of the applicant alone that he came within some of the provisions of the law.

Fourth. The production of an oath of allegiance or amnesty, taken at some time by the applicant.

Fifth. Where the applicant was certified or vouched for by some official, either civil or military.

With some doubts as to the legality of issuing certificates to persons of publicly known Union sentiments without proof, the clerk being the judge, I have, nevertheless, admitted that method of registration where there was no evidence of abuse of the discretion assumed by the clerk.

The second method enumerated is clearly legal, but the last three are as clearly illegal.

Believing that an applicant for registration must either be known to have been a man of publicly known Union sentiments, at all times, or must produce proof under oath that he comes within the provisions of the law, I have, in the application of this construction, "thrown out and not taken into account," the votes cast in the following counties as illegally registered, viz : Hawkins, McMinn, Monroe, Meigs, Grundy, Van Buren, White, Putnam, Jackson, Macon, Coffee,

Franklin, Marshall, Benton, Williamson, Davidson, Sumner, Robertson, Cheatham, Maury, Humphreys, Montgomery, Stewart, Lawrence, Gibson, Weakley, Madison, and Lauderdale.

The vote of the following counties having been registered in the one or the other of the two modes first enumerated have been taken into account, viz:

Johnson, Carter, Greene, Cocke, Jefferson, Sevier, Grainger, Union, Knox, Campbell, Anderson, Morgan, Blount, Bradley, Hamilton, Polk, Marion, Bledsoe, Meigs, Warren, Smith, DeKalb, Rutherford, Lincoln, Giles, Cannon, Coffee, Franklin, Wilson, Hickman, Wayne, Dickson, Hardin, Henry, Obion, Dyer, Carroll, McNairy, Putnam, Hardeman, Shelby, and Haywood.

From the following counties I have no satisfactory reports, the presumption being in favor of the legality of the registration, viz: Sullivan, Washington, Hancock, Scott, Polk, Roane, Sequatchie, Cumberland, Fentress, Rhea, Overton, Bedford, Perry, Lewis, Decatur, Henderson, Fayette, and Tipton.

The following table shows the vote of each district as shown by the original returns, and, also, as modified by omitting counties improperly registered:

FIRST DISTRICT.

	Total.	Cast out.	Corrected.
N. G. Taylor.....	5,236	180	5,056
J. K. Miller.....	4,400	740	3,720
J. H. Randolph.....	1,626	32	1,594
T. D. Arnold.....	26	4	22

SECOND DISTRICT.

H. Maynard.....	7,156	1,557	5,599
J. A. Cooper.....	2,323	212	2,081
L. C. Houk.....	1,859	209	1,650
R. K. Byrd.....	1,210	376	834
F. S. Heiskell.....	217	57	160
B. Wells.....	21	14	7

THIRD DISTRICT.

W. B. Stokes.....	4,454	1,855	2,599
A. Faulkner.....	2,549	1,535	1,024
J. R. Hood.....	845	664	181

FOURTH DISTRICT.

Edmund Cooper.....	7,684	2,366	5,318
James Mullins.....	224	16	208
Featherstone.....	1	1	0
Wisener.....	9	0	9

FIFTH DISTRICT.

W. B. Campbell.....	6,354	5,043	1,311
S. J. Carter.....	1,729	1,524	205
W. R. McDougal.....	11	4	7
W. L. Waters.....	2	0	2
J. H. Smith.....	2	0	2

SIXTH DISTRICT.

D. B. Thomas.....	2,805	2,284	521
S. M. Arnell.....	2,350	804	1,546
Collier.....	1	0	1

SEVENTH DISTRICT.

	Total.	Cast out.	Corrected.
I. R. Hawkins.....	3,322	1,254	2,068
E. Etheridge.....	1,819	1,115	704
Scattering.....	5	1	4

EIGHTH DISTRICT.

R. S. Saunders.....	588	63	525
J. W. Leftwich.....	1,673	305	1,368
Wm. Hunter.....	100	3	97
John Bullock.....	600	3	597
Wm. C. Dunlap.....	525	32	493

With regard to the election of members of the legislature to fill the vacancies you are the exclusive judges. But with regard to the election of officers to be commissioned by the executive I have a duty to perform, and must know that a valid election has been held.

If there had been no other law to be regarded in the issuance of commissions, or certificates, to the members of Congress but the code (sec. 935,) my duty would have been quite plain. But the "act to limit the elective franchise" has been since passed. It proposes a great change—I may say revolution—in our elective system. It announces that a large portion of our people have made war upon the government, and are unsafe depositories of the elective franchise. It provides, moreover, for a registration of voters, and declares that no one is a legal voter unless he shall have a certificate of registration, and that certificate must be obtained in a legal way. A valid registration becomes indispensable to a valid election.

Again, by an act of Congress approved March 3, 1865, before the clerk of the House of Representatives can enrol a member, his certificate must show that he was regularly elected, according to the laws of the State, or of the United States.

With official information before me that the votes cast for a candidate are illegal and his election void, I cannot, and will not, certify that he is regularly elected, according to the laws of the State. Whatever others may think of my duty, I will not declare in a certificate, or otherwise, that the election was regular in counties and districts when I officially know that it was *not* regular.

It will be seen that the law was more extensively disregarded in the Middle than in either of the other divisions of the State. In the face of my proclamations and address, in spite of the telegraphic instructions of the President, and the presence of the military, but one single county in the Nashville district held an election according to law, and that only in part. In the county of Wilson there were 1,026 legal, and 593 illegal votes cast. Governor Campbell received his certificate on the vote of Wilson alone, having received all the votes cast in that county but 180, every other county in his district being thrown out. It is no doubt true that of 6,354 votes received by Governor Campbell, many, perhaps a majority, were cast by citizens who were entitled to vote if legally registered.

In the sixth congressional district I am compelled to throw out the votes of the counties of Maury, Humphreys, Montgomery, Lawrence and Stewart, the registration being clearly void, according to the reports of the clerks in answer to the proclamation of August 11. This produces a different result than that produced by the sheriff's returns of the whole vote. The vote of the counties of Dickson, Hickman, and Wayne, which appear to be correctly registered, elects Mr. Arnell, by a majority 791 votes. The votes of the counties of Perry, Lewis and Decatur, whose clerks have not responded to the proclamation will increase this majority to near 1,000. Counting the entire vote of the district

without regard to the mode of registration, Mr. Thomas received 2,805 votes, and Mr. Arnell 2,352

My construction of the law which regulates my duties compels me to issue a certificate to Mr. Arnell, but I am relieved of much responsibility by the fact that my decision is not conclusive, and that the question is still open for the action of Congress.

In the other congressional districts majorities are reduced or increased by the action I have taken, but the result is in no case changed.

The entire vote of the State is 61,783; omitting the vote illegally registered, it is reduced to 39,509. But I must repeat that there can be no doubt but a large portion of the voters in the counties I have been constrained to reject, were justly entitled to certificates if the law had been complied with. I sincerely regret that loyal men should be deprived of their votes by the fault or mistake of others. The remedy lies in a new registration, which I hope will be at once ordered, for, having acted in this matter with deliberation and from a sense of right, I shall be compelled hereafter to disregard elections held in the counties indicated in this report as illegally registered.

The official reports of the clerks and sheriffs, in response to the proclamation of August 11, as well as the original returns, are on file in the office of the secretary of State, subject to the examination of all concerned.

Respectfully submitted,

W. G. BROWNLOW.

PROCLAMATION.

STATE OF TENNESSEE, EXECUTIVE DEPARTMENT,

Nashville, July 10, 1865.

Whereas it has been made known to me that in many parts of Middle and Western Tennessee, those who have been lately in rebellion against the United States, with their friends and sympathizers—and with hands yet red with the blood of our loyal people—are either openly defying, or indirectly setting at naught, an important law of the land;

And whereas it is made the duty of the governor, by the constitution and his oath of office, “to take care that the laws be faithfully executed;”

Therefore, I, William G. Brownlow, governor of the State of Tennessee, do proclaim that the act of the general assembly, passed on the 5th day of June, 1865, entitled “An act to limit the elective franchise,” having been deliberately passed under an express authority delegated to said general assembly by the convention of the 9th of January last, which delegation of power was solemnly ratified by the people at the ballot-box, and proclaimed by the military governor on behalf of the United States, as the organic law—is the supreme law of the land, and will be rigidly enforced; and all who shall band themselves together for the purpose of defeating the execution of said law will be declared in rebellion against the State of Tennessee, and dealt with as rebels.

And I do proclaim that no person is entitled to vote at any election by the people of this State unless he shall first actually prove, by testimony under oath, that he comes within the provisions of the first section of said law; and shall obtain a certificate of registration as prescribed in said law, upon such proof in fact made; and that the votes of all persons and of all counties contrary to the strict provisions of this law will be thrown out, and will not be taken into account in the office of the secretary of state.

And I do further proclaim that said law requires that every candidate for office shall take the oath prescribed by the seventh section of said act; and no person is or can be a candidate until he shall have properly taken and subscribed

said oath; and I do declare that any person pretending to be a candidate for Congress or other office, who shall fail to take and subscribe said oath, and file the same in the office of the secretary of state, on or before the third day of August next, will not be treated as a candidate, and all votes for such person will not be taken into account.

And I call upon the civil authorities throughout the State to arrest and bring to justice all persons who, under pretence of being candidates for Congress, or other office, are travelling over the State denouncing and nullifying the constitution and laws of the land, and spreading sedition and a spirit of rebellion.

I also command all the clerks of the county courts and judges of elections, faithfully and strictly to perform, and not evade, the responsible trust confided to them by said law; and I solemnly warn them that they will be held to a strict account for any failure in this respect.

In testimony whereof, I have hereunto subscribed my name and caused the great seal of the State to be affixed, at the department in Nashville, this 10th day of July, A. D. 1865.

[SEAL.]

By the governor:

WILLIAM G. BROWNLOW.

A. J. FLETCHER,
Secretary of State.

PROCLAMATION.

EXECUTIVE DEPARTMENT,
Nashville, Tennessee, August 11, 1865.

Whereas information has reached this department, from various portions of the State, that the provisions of the recent act of the legislature to limit the elective franchise have been in some counties erroneously construed, in others wilfully evaded, and in some instances totally disregarded.

And whereas it becomes the duty of the executive to ascertain to what extent the vote taken on the third day of August, 1865, constitutes a legal and valid election: Therefore—

I, William G. Brownlow, governor of the State of Tennessee, with a view to ascertain my own duty, and the rights of all concerned in said election, do call upon all the clerks of the county courts, and all the sheriffs of the different counties of the State, to report to me in detail the manner in which said law has been executed in their respective counties. Said clerks are requested, without delay, to respond to the following interrogatories:

First. Did you or your deputies issue certificates of registration without proof, under oath, that the applicant came within the provisions of the first section of said law? If so, what proportion of the voters of your county obtained certificates in this way?

Second. Did you or your deputies issue certificates upon the oath of the applicants alone? If so, estimate the number or proportion as nearly as practicable.

Third. Did you or your deputies issue certificates to persons who had been disloyal, but who had taken the oath of allegiance, upon their statement or oath that they would have voted in the November, February, or March elections? If so, what number?

Said sheriffs are requested to answer the following interrogatories in behalf of themselves and deputies without delay:

First. Did all judges of election in your county take the oath required by the seventh section of said act? If any did not, what was the number of votes cast at the said district where such judges presided?

Second. Did the judges of election, where a vote was challenged, administer said oath? And did they regard the taking of said oath as conclusive of his right to vote?

It is expected that the answers of said clerks and sheriffs will be full and accurate. If they are not, an investigation will be ordered. And all loyal citizens are invited to communicate information touching the foregoing matters of inquiry.

And I do assure the loyal citizens of the State that no array of numbers, however great, no clamor of disfranchised rebels, however loud, and no combination of apostate Union men, however respectable or talented, will prevent the execution of said law, according to its substance and spirit.

In testimony whereof, I have hereunto subscribed my name and caused the [SEAL.] great seal of the State to be affixed. At Nashville the 11th day of August, A. D., 1865.

WM. G. BROWNLOW.

NOTE.—After the foregoing report was submitted additional reports were received from the counties of Hawkins and McMinn, which show these counties correctly registered. They will, therefore, be so regarded.

W. G. BROWNLOW.

EXHIBIT B.

MESSAGE.

STATE OF TENNESSEE, EXECUTIVE DEPARTMENT,

Nashville, April 13, 1866.

Gentlemen of the Senate and House of Representatives :

The extraordinary circumstances under which you resume your seats, after the untoward events of the past six weeks, make it my duty, as I conceive, to send you this communication, giving such information as I possess concerning the state of the government.

Two elections have occurred since your deliberations were broken up by the action of a portion of the House; the one a general election of county officers on the 3d of March, the other a special election of twenty-four representatives and two senators, in different parts of the State. The result of these elections, carefully studied, will furnish you much instruction in the discharge of your present duties. It will appear that the public safety absolutely requires a thorough revision of the present suffrage laws. While it is true that in many counties in West Tennessee a very creditable, and in some instances a successful, effort was made to execute the act of the 5th of June last, in some counties of that section, and in the greater portion of Middle Tennessee, the law was totally disregarded. In the county of Davidson, for instance, where there has been so much clamor against the law, charging that three-fourths of the people were disfranchised by it, the aggregate vote exceeded, by over a thousand, the average vote in county elections before the passage of the law. Candidates in many localities openly and publicly based their claims to election upon wounds received and losses incurred in the cause of rebellion, and were often successful.

In the special election nearly all of those who had by revolutionary conduct broken up the legislature and paralyzed the government were candidates for re-election, under pledges to repeat their performances unless the majority will yield to them the control of your proceedings. With two exceptions in West Tennessee, one in Middle Tennessee, and two in East Tennessee, they have been returned by large majorities. This result may well excite the apprehen-

sions of the friends of civil government. It shows that not only the revolting representatives, but their constituents, are ready to destroy the State government. The fear expressed in my proclamation of the 3d of March, that "our people have not sufficiently recovered from the demoralizing effects of the late rebellion to appreciate the blessings of peace," is thus painfully realized.

As the legality and propriety of my proclamation of the 3d of March in ordering some of the elections have been questioned, and may come incidentally before you in determining the qualifications of the new members, I will present briefly the grounds of my action:

The constitution provides that "where vacancies *happen* in either house, the governor for the time being shall issue writs of election to fill such vacancies." No particular form of vacating a seat is prescribed. It is sufficient if the seat is not occupied, and no legitimate excuse or reason given for its remaining so. If a member wilfully and persistently refuses to occupy his seat and perform any of the duties of his place, the seat is in fact and in law vacant. It may be the duty of the house to notify the executive when a vacancy happens, but when the house is disorganized or not in session it becomes his duty to know when to act. Upon this construction of the constitution and this view of my official duty, I issued writs of election to fill the seats of those who had absented themselves from the house for the declared purpose of disorganizing it, and who had publicly proclaimed that they had withdrawn from your deliberations. This much I deem proper to say in justification of my action. You are the exclusive judges of the qualification and election of your members, and I only announce my own action and the reason which governed it, and refrain from any recommendation as to the rights of the newly elected members. The extreme peril of the crisis in which we find ourselves will, however, justify me in calling your attention to the fact that a number of members are asking seats in your body under a pledge, endorsed by their constituents, to disorganize the legislature by revolutionary conduct. I therefore invite your serious attention to the grave question it presents.

The objections to a stringent suffrage law are plausible, and made under the guise of equal rights and republican liberty, but experience will show that those who, but a few months since, were engaged in the work of destroying all government, and who succeeded in destroying our State government, and only failed to destroy the national government by being overpowered by force of arms, are not yet safe depositories of the elective franchise. It is not a question as to who shall be disfranchised, but as to who shall be enfranchised. Those who committed treason disfranchised themselves. To restore them at once to the right of suffrage is simply to hand over to them that government which was organized in spite of them upon the ruins of the one they had destroyed. This is now what they demand. The red-handed marauder who has inflicted the most frightful wounds upon the body politic, claims that he, of all others, is the proper surgeon to heal them. They claim the exclusive right to destroy and build up—to kill and to restore to life. You alone, gentlemen, can dispose of this question. In a crisis like this, we should adopt no timid course. Let us fearlessly perform our part, and leave the result to God. I invoke your prompt attention to this vital subject. We can have no hope that capital or loyal emigrants will come within our borders until they are assured of protection against rebel rule. I am assured that the tide of emigration now flowing into Missouri is owing to the ample protection given to them in that State by the disfranchisement of the destroyers of law and order.

I have been compelled, by a sense of humanity, to direct the comptroller to issue his warrant upon the treasury for a considerable sum, without any act of appropriation, to supply the convicts of the penitentiary with the necessaries of life. I am informed that they are again in danger of suffering. The agent of the institution is procuring supplies on credit, relying upon you to meet the pay-

ment. The hospital for the insane is in like necessitous circumstances, and the salaries of the officers of both institutions are unpaid. Your early action in relief of both is an absolute necessity.

I apprehend that sufficient provision has not yet been made to meet the July interest on the State debt proper, and upon the bonds loaned to such railroads as may fail to pay their coupons then falling due. I recommend the temporary appropriation of the funds realized by the sale of specie captured with the remains of the Bank of Tennessee for that purpose, without permanently withdrawing it from the school fund.

After mature deliberation, I have determined to recommend to your favorable consideration the remuneration of loyal citizens of this State for losses sustained by the occupation of the country by the national armies. The passage of the so-called ordinance of secession, and the assumed transfer of the State to the so-called southern confederacy, placed Tennessee in the attitude of rebellion, and her people in the position of enemies to the national government. The consequence was that upon the occupancy of the State by the national forces, our people were treated as enemies, with but little discrimination between the loyal and disloyal. Their lands and houses were occupied, their property impressed or destroyed, and their provisions consumed. In East Tennessee this was done from necessity, by an unsupplied army, to an extent that reduced the people to absolute suffering. Thus far the federal government, classing Tennessee with the rebel States, and unwilling to assume the losses incurred in the whole south, has not regarded the applications of our loyal people for remuneration. I understand that similar losses by the citizens of Indiana, Pennsylvania and Ohio have been promptly assumed, and yet the nation knows, and the world knows, that a more loyal people than those in Tennessee who remained steadfast to the national cause, through so long and terrible an ordeal, are not to be found in the Union. But I cannot and will not lose confidence in the justice and magnanimity of the American people. I believe they will yet cheerfully repay the loyal sufferers among our people, many of whom were deprived of their property by the national forces while they were themselves absent fighting for the national cause.

But you, gentlemen, can afford present relief, relying upon the general government hereafter to assume and pay these just and meritorious claims.

I recommend that proper officers be appointed to ascertain and audit those claims, and that the bonds of the State of denominations from \$50 to \$100 be issued in payment. I am aware that this proposition will meet with fierce opposition from those who would give preference to the millions of debt contracted by the usurped State government, or by rebel quartermasters. I am also aware that objection will come from a better class upon the ground of so considerable an increase of the State debt; but if the American people are just, they will assume the amount long before it falls due, and, upon principle, treat the suffering loyalists of Tennessee as they have treated the loyalists of other States.

In view of the protracted length of your session, caused in part by difficulties attending a reorganization of the State government, but chiefly by the refractory and rebellious conduct of a minority, you will pardon me for expressing the hope that you will proceed promptly and vigorously with the necessary legislation, not only as a matter of economy to the treasury, but to give quiet and repose to the people by the final and permanent establishment of a State policy which shall give security to the loyal and restrain the disloyal.

W. G. BROWNLOW.

STATE OF TENNESSEE, *Hardin county* :

Be it remembered that on this the second day of January, A. D. 1867, personally appeared before me, the undersigned, clerk of the county court of Hardin

county, Tennessee, N. M. D. Kemp, esq., late sheriff of Hardin county, Tennessee, who, after being duly sworn according to law, deposes and says on his oath that he was the sheriff of said county of Hardin on the first Thursday of August, A. D. 1865, and before and since that day; and that on that day he opened and held an election in said county, in accordance with the constitution of said State of Tennessee and the proclamation of the governor of the State of Tennessee aforesaid, at all the places of voting in said county, for a representative in the Congress of the United States of America, and other officers for the county and State aforesaid, and that S. M. Arnell was the person voted for as a representative in Congress by the name of A. M. Arnell, the initials of the Hon. S. M. Arnell not being then known to myself or the voters, and that there is no person in this congressional district by the name of A. M. Arnell to the best of affiant's knowledge and belief. Affiant further states that he knows, of his own personal knowledge, that the Hon. S. M. Arnell was the person meant to be voted for at said election, on the day and year aforesaid at the election aforesaid, and that he makes this affidavit of his own free will and accord, and without any reward or hope thereof.

N. M. D. KEMP,
Late Sheriff of Hardin County.

Sworn to and subscribed before me this the 2d day of January, 1867, and I hereunto attach the seal of said county.

[SEAL.]

BOLLIS HINKLE,
Clerk of Hardin County Court.

STATE OF TENNESSEE, *Perry county, ss :*

I, John L. Webb, sheriff of said county, do certify that I caused to be opened and held an election in said county of Perry on the first Thursday in August, 1865, for member to Congress of United States. S. M. Arnell received 153 votes; Thomas received 6 votes. December 28, 1866.

J. L. WEBB, *Sheriff.*

Personally appeared before me, an acting justice of the peace, John L. Webb, sheriff, and made oath that said election on first Thursday of August, 1865, was held, and said number of votes for said candidates was polled, viz: S. M. Arnell, 153; Thomas, 6.

Witness my hand and seal. Sworn to and subscribed December 28, 1866.

[SEAL.]

BRITAN PYLAN,
Justice of the Peace.

Replies of Clerks and Sheriffs.

The following replies were received from the clerks and sheriffs of the counties composing the sixth congressional district of the State of Tennessee:

LAWRENCEBURG, TENN., *August 16, 1865.*

In answer to your proclamation of the 11th of August, 1865, I, S. A. Carrell, clerk of the county court of Lawrence county, would most respectfully respond as follows, to wit: To interrogatory 1st I answer that I did not issue certificates of registration to any persons without proof under oath that said persons fell within the provisions of the 1st section of the franchise law, except to some fifteen or twenty persons, who have been known to entertain unconditional Union sentiments from the outbreak of the rebellion, all of which, except the certificate to Mr. W. A. Garner, representative, and Mr. A. M. Harrison, sheriff, was issued before receiving your proclamation requiring all persons to make said proof as aforesaid.

To your second interrogatory I answer that, as a general rule, the certificates were issued upon the oath of the applicants alone, where the proof of two persons were not required by said first section of said law; but in many cases other proof was required and made.

To your third interrogatory I answer that where certificates were issued to persons who had been disloyal upon the claim that they had taken the oath of allegiance and would have voted at the previously mentioned election, if an election had been held within their reach, they were in all cases required to make oath of those facts, and in some instances other proof was required, but not in many cases. I have lived in the county for the last thirty-nine years and upward, and am acquainted with most of the persons in the county, and in all cases where I knew the person to be in good standing I required nothing but their own statement under oath, believing that in regard to the last interrogatory they knew their own intentions better than any other person or persons. The persons registered are generally of fair reputation and I believe with, perhaps, a very few exceptions, clearly fall within the provisions of the first section of said law. I did not register any person that did not consider himself brought within the provisions of the act. My deputy, W. P. H. Turner, registered but few, and if he violated my rules or instructions in any case I have heard nothing of it; I tried to comply strictly with said law. The Union men of the county can testify as to how I discharged my duty.

Very respectfully,

S. A. CARRELL, *Clerk.*

His excellency W. G. BROWNLOW, *Governor of Tennessee.*

P. S.—We regarded the act to limit the elective franchise as the supreme law of the land upon that subject, and endeavored to fully comply with it to the best of our ability.

S. A. CARRELL, *Clerk.*

To his excellency the governor of the State of Tennessee:

I, Alford M. Harrison, sheriff of Lawrence county, in obedience to your excellency's proclamation of the 11th of this instant, would most respectfully report as follows:

To first interrogatory I answer that I selected good and true men to hold the election in Lawrence county, as judges of the same, and to the best of my knowledge, information, and belief, all of said judges took the oath required in the seventh section of the act to limit the franchise of the citizens of the State of Tennessee, and that they might be informed properly upon the great question of their duty I sent to each district a copy of said bill together with your excellency's address to the people of the State.

To second interrogatory I answer that, so far as I know, there was but one voter challenged in the county, and he was permitted to vote without taking the oath by the indorsement and recommendation of two of the judges, said voter having voted on the 22d day of February, 1864. I further state to your excellency that I am true to the State government of the State of Tennessee, and have done all I could to restore the same in every respect. All of which is respectfully submitted.

ALFORD M. HARRISON,
Sheriff of Lawrence county.

WAYNESBORO', August 29, 1865.

SIR: Your proclamation of August 11 came to hand to-day, in which I find certain questions propounded to county court clerks. I, as clerk of the county court of Wayne county, would respectfully submit the following answer:

To your first interrogatory I answer in the affirmative; to the second and third I answer in the negative. Upon receiving the act for the limitation of the elective franchise, having no legal adviser, I consulted with undoubted Union citizens as to whether undoubted Union men should be required to make proof under oath, all of whom were of opinion that such persons should not be required to make such proof, and I was of the same opinion from the reading of the act, and I issued to persons whom I personally knew to be undoubted Union men certificates of registration in accordance with that opinion, probably one-fifth of the whole number. However, on receiving your proclamation bearing date, I believe, July 12, which showed that proof under oath must be in fact made in all cases, which was on the first day of August, only two days before the election, I acted in accordance with your opinion, and, so far as I could, summoned proofs under oath for those to whom I had issued certificates without such proofs having been made, so that on the day of election there were about one-tenth of the whole number who had not been so proven, the most of whom, however, have since been proven.

All of which is respectfully submitted.

Yours respectfully,

JOHN H. COLE, *Clerk.*

His Excellency Governor W. G. BROWNLOW,
Nashville, Tennessee.

WAYNESBORO', *August 30, 1865.*

SIR: Your proclamation of August 11 requiring me to answer certain questions in said proclamation I cannot answer until I have time to inquire of my deputies who held the elections at the different districts. Your proclamation of July 12 did not come to hand in time to notify my deputies to swear the judges and clerks to the seventh section of the franchise law. I have inquired recently of my deputies of eight districts, in two of which districts they were not sworn to said section of the franchise act. In those two districts Mr. Thomas received 8 votes; Mr. Arnell, 49. So soon as I can investigate the matter I will report in full.

Yours respectfully,

JOHN GRIMES, *Sheriff.*

His Excellency W. G. BROWNLOW, *Governor.*

SAVANNAH, TENNESSEE, *September 11, 1865.*

SIR: In reply to the several interrogatories made in your circular addressed to the clerks of the county courts and sheriffs of this State, in relation to the elective franchise, I can say that no one obtained a certificate of registration at my office without proof, under oath by two disinterested voters, that the applicant came within the provisions of the first section of the law in such cases made and provided by the last legislature.

2d. No certificate of registration was issued upon the oath of the applicant alone.

3d. No certificate of registration was issued to persons who have been disloyal, but have taken the oath of allegiance, upon their statement, on oath, that they would have voted in the November, February, or March elections.

Very respectfully,

BATTIS HINKLE,
Clerk Hardin County.

His Excellency W. G. BROWNLOW.

Decatur county, no returns.

Perry—Thomas, 6; Arnell, 153. No report.

Lewis—Thomas, 3; Arnell, 59. No report.

COLUMBIA, *August 18, 1865.*

DEAR SIR: In reply to your proclamation of the 11th instant, in regard to the franchise act, I beg leave to report:

1st. That I issued but few certificates without proof, under oath, and those were to men with whose antecedents I was acquainted, and who had voted against separation and representation, and who have been Union all the time; such men as the Hon. Samuel D. Frierson, Benjamin Harlan, &c. The number, I think, so issued, say fifty.

2d. Independent proof was taken in regard to a great many who claimed to have publicly entertained Union sentiments, as mentioned in the act, and I not being acquainted with their antecedents, witnesses were sworn in all such cases, all of which witnesses were true and loyal. The number registered in this way, I think, is about two hundred.

3d. Certificates were issued to persons who had been disloyal (but had taken the oath of allegiance) upon their oath that they had or would have voted in the November, February, or March elections, and that it was their intention and purpose so to do, but were prevented by high water, &c., or could not get to the election. I examined and questioned them closely, as required by law.

In Maury county, in February and March, 1865, when the elections were holden, a large portion of the voting population were cut off from the place where the elections were held by high water. The number registered upon the oath of the applicant alone, I think, is 930; of this number, those who voted in former elections, (say November, 1864, February and March, 1865,) I think, are 550. At the November election in 1864 there was, in Columbia, 131. At the February election in 1865 there was polled, in Maury county, 654. At the March election in 1865 there was polled, in Maury county, I think, 262. The number of certificates issued is 1,180. The number who voted 3d August, 1865, is 1,042. The number who did not vote is 138.

Respectfully submitted.

JOHN B. PADGETT,
Clerk Maury County Court.

WILLIAM G. BROWNLOW, *Governor.*

COLUMBIA, TENN., *August 17, 1865.*

His Excellency WILLIAM G. BROWNLOW, *Governor, &c.:*

In response to your proclamation of the 11th of August, 1865, and the interrogatories therein contained, I would respectfully make answer as follows:

Answer to interrogatory first. As sheriff of Maury county, Tennessee, I held, in person, on the 3d day of August, 1865, the election at Columbia, the county seat of said county, and by my general and special deputies at the other precincts in said county; that, prior to the day of election, I procured and forwarded to each precinct in said county a copy of said oath, required by the recent act of the legislature to limit the elective franchise, to be taken by the judges of the said election, and gave special instructions to the officers holding said election at the other precincts in each and every case to administer said oath to each and all of said judges, the oath being that required by the seventh section of said act. I administered said oath to the judges holding the elections at Columbia, and from reports made to me by the officers holding the election at the above precincts in said county, and from information obtained from these persons, I believe that said oath was administered to the judges holding said election at each precinct in said county.

In answer to interrogatory second, I state that at Columbia, the precinct where I held the said election, whenever a vote was challenged the judges did, or I, at their request and in their presence, did administer the said oath to each voter whose vote was challenged; and from the best information I can obtain on the

subject the same was done by the judges at the several precincts in said county. When a man had a certificate of his qualification as a voter in due form from the clerk, and then took said oath, if his vote was challenged, I believe that such certificate and such taking of the oath were by the judges regarded as conclusive of the voter's right to vote, and he allowed to vote.

Having, as I believe, fully answered your interrogatories, and to the best of my information and belief,

I am, dear sir, yours, most respectfully,

W. M. SULLIVAN,
Sheriff of Maury County.

CENTREVILLE, TENN., *August 20, 1865.*

SIR: I embrace this my earliest opportunity of responding to your proclamation of August 11, having never reached me until a day or two ago, which I propose to comply, to wit:

1. I had no deputy, and hence I alone issued all the certificates that went out. I did not require loyal citizens, that were publicly known to be such, to make proof of loyalty. I placed no construction, nor required any other than what was made my duty by the franchise bill, but notwithstanding there was some fifty or sixty illegal votes given in, as appears from the enclosed schedule. I ordered each voter to write his name on his ballot, and return the ballots with the poll-book from each precinct, which was done, thereby enabling me to properly ascertain the number of illegal votes given in, which I hope will be satisfactory.

I am, yours, truly,

M. H. PUCKETT,
Clerk of County Court, Hickman County, Tenn.

His Excellency the Governor, W. G. BROWNLOW.

The clerk of the aforesaid county of Hickman accompanies with his report, a full list of all the voters of the county, showing who are legal and who are illegal, which gives the following result: Thomas 51 illegal votes and 57 legal votes; Arnell, (1) one illegal vote and 138 legal votes, which leaves Arnell 81 votes majority; 3 or 4 ballots lost.

His Excellency W. G. BROWNLOW, *Governor of the State of Tennessee:*

In obedience to your proclamation of August 11, 1865, asking my answer to the said interrogatories therein set forth. 1st. In 12 of the districts of Hickman county all the judges of the last election were sworn in strict conformity to said 7th section of the act alluded to in said proclamation; in two of the districts, they being the remainder of the districts in Hickman county, the judges of the election last passed were not sworn as prescribed in the 7th section of said act. The votes cast in said last mentioned districts are as followeth: in district No. 8 there was but 7 votes polled, all for Thomas; in district No. 13, there were 4; all for Thomas. In the 15th district there was no election held.

Interrogatory 2d. There was but one voter challenged in the county, and he did not vote. All of which is respectfully reported.

JOSEPH BEASLEY,
Sheriff of Hickman county.

WAVERLEY, TENNESSEE, *August 16, 1865.*

I take the earliest opportunity to reply to the interrogatories in your proclamation of 11th instant. In answer to the first question to county clerks, I would state that no certificates of registration were issued by me or my deputy

without proof, under oath, that the applicant came within the provisions of the 1st section of the law referred to by you; that is to say, all that obtained certificates of registration in this county came within the provisions of the 1st section of the act to limit the elective franchise, according to my construction of the act, from all the lights I have upon the subject. And to second question, with the exception of two or three persons, all who obtained certificates got them upon the oath of the applicant alone.

In answer to your third question I can say that a part of the certificates issued here were issued to persons who had been disloyal, but who had taken the oath of allegiance, and who stated on oath that they would have voted in the elections of November, February, and March if they had been held in their reach, and that they were true friends of the government of the United States, but what number of them had been disloyal, I cannot say with certainty. I suppose that perhaps one-fourth of them had been in the rebel army, and left it some eighteen months or two years ago, and some of them more than two years ago returned home, sought protection under the United States government, and took the oath of allegiance and remained at home. There were others who, during the early part of the rebellion, were disloyal in feeling, or were so considered, and afterwards took the oath of allegiance, but I have no way of telling what number; all who obtained certificates I regarded as being at that time, and as having been for some time before, loyal to the United States, and friends to the government thereof, and I considered them entitled to certificates.

Yours, with due respect and esteem,

LEVI M. CALLUM,

Clerk of the county court of Humphrey county, Tennessee.

Hon. WM. G. BROWNLOW, &c.

CLARKSVILLE, TENN., August 19, 1865.

DEAR SIR: In reply to your interrogatories in your proclamation of the 11th instant. In reply to your first question I will state the number of certificates issued by me as near as I can, without administering an oath under section 1st of the franchise law, to be about one hundred and thirty. This number embraces those who had voted in the Presidential election in November, 1864, and those who voted in the February and March elections, 1865, and also those of undoubted loyalty.

In answer to your second question: I issued certificates to about 500 persons on their oath alone. In answer to your third interrogatory, the number of certificates issued to persons who had been disloyal, but who had taken the oath of allegiance to the United States before the 4th of March, upon their oaths or exhibiting the oath of allegiance, and would have voted if the election had been held within their reach, all of the number and persons embraced in my second answer, say about 500. I did not keep my register in a way that I might have done to detect any error in the certificates issued, as I did not issue a certificate unless I thought the applicant entitled to vote under the 1st section of the franchise act. I may have committed some errors in my issuing certificates; if so, it was unintentional, as my constant aim, in all cases, was to do my duty as an officer of the county and State. I am complained of by many of my personal friends for not giving them certificates.

If reference is necessary, I can only refer you to the whole community of our town and county.

Respectfully, your obedient servant,

W. E. NEWELL, C. C. M. C.

W. G. BROWNLOW,

Governor of the State of Tennessee, Nashville.

DOVER, TENNESSEE, *October 5, 1865.*

DEAR SIR: In response to your interrogatories in regard to the election recently held, I have again briefly to state that all the judges of election in my county were duly appointed according to law. That the oath required of them in his excellency Governor Brownlow's proclamation was duly administered to them all, and that no one voted at said election without a certificate as required by the franchise bill, and that the oath prescribed by said bill was duly administered to every voter whose right to vote was challenged.

I am, very respectfully,

W. S. KEEL,
Sheriff of Stewart County.

Hon. A. J. FLETCHER,
Secretary of State.

DOVER, TENNESSEE, *October 10, 1865.*

DEAR SIR: In accordance with the proclamation of Governor Brownlow, I some time since made a statement upon the subject therein embraced, which, I have been informed within the last two days, never came to hand. I will now proceed to respond a second time, by saying, in the first place, that I endeavored to understand and to perform my duty in the issuing of certificates to voters in the utmost good faith and in strict obedience to the law as I understood it.

In response to your first interrogatory, I reply that no certificate was issued without proof under oath that the applicant came within the provisions of the 1st section of the act, unless it was in a very few instances to men of undoubted union sentiments.

In response to your second interrogatory, I reply that I suppose that about one-third of the applicants obtained certificates upon their oath alone, but in nearly every instance upon their producing certificates of having taken the oath of allegiance, or amnesty oath, and upon my being satisfied from my knowledge of the character of the applicant, and from other circumstances, that they had kept the oath in good faith, and demeaned themselves as loyal citizens.

In reply to your third interrogatory, I reply that very few, not exceeding twenty-five, obtained certificates upon their statement on oath that they would have voted in the elections referred to, and those were kept from coming to the election by reason of back-water, guerillas, and other insurmountable obstacles.

All the residue of the persons who obtained certificates did so upon proving satisfactorily to me, by the oaths of other persons, accompanied by certificates that they had taken the oath of allegiance or amnesty, and had conducted themselves as good, peaceable and loyal citizens ever since said oaths were taken, or that they had voted in some of the elections required by the act as a qualification to obtain certificates. No certificate was issued to a single rebel soldier who continued in the rebel service until the expiration of the war. Nearly all the successful applicants claimed to have been loyal citizens, and proved themselves to have so conducted themselves to my satisfaction by the testimony of creditable witnesses.

I have the honor to present assurances of my highest consideration.

Yours, truly,

W. COOK,
Clerk of the county court, Stewart county.

Hon. A. J. FLETCHER,
Secretary of State of Tennessee.

CHARLOTTE, TENNESSEE, *August 22, 1865.*

To his excellency W. G. Brownlow, governor of Tennessee :

I herein enclose the manner in which the election on the 3d of August in my county was conducted.

District No. 1. Judges were qualified according to section 7 of an act to limit the elective franchise. Three votes were challenged, and deputy did consider taking said oath entitled him to vote.

W. H. HORNER, *Deputy Sheriff.*

No. 2. Judges were qualified as above. No voter challenged.

W. T. DUNIGAN, *Deputy Sheriff.*

No. 3. Judges were qualified as District No. 1. No vote challenged.

F. McCOSTIN, *Deputy Sheriff.*

No. 4. Judges were qualified as No. 1. No vote challenged.

J. W. SULLIVAN, *Deputy Sheriff.*

No. 5. Judges were qualified as No. 1. No vote challenged.

N. M. HALL, *Deputy Sheriff.*

No. 6. Judges were qualified as No. 1. No votes challenged.

M. G. HARRIS, *Sheriff.*

No. 7. Judges were qualified as No. 1. No votes challenged.

A. N. STROUD, *Deputy Sheriff.*

No. 8. Judges were qualified as district No. 1. Voters were challenged. Deputy sheriff did consider taking the oath entitled them to vote.

D. L. MATLOCK, *Deputy Sheriff.*

No. 9. Judges were qualified as No. 1. No votes challenged.

J. F. BOTTS, *Deputy Sheriff.*

No. 10. Judges were qualified as No. 1. No votes challenged.

GEO. COOKSY, *Deputy Sheriff.*

No. 11. Judges were qualified as No. 1. Three votes were challenged; and deputy did consider taking said oath entitled them to vote.

JESSE DANIEL, *Deputy Sheriff.*

No. 12. Judges were qualified as No. 1. No votes challenged.

J. B. MILLS, *Deputy Sheriff.*

I have taken the trouble to go round and see all my deputies; therefore I hope my report will be satisfactory.

Very respectfully,

M. G. HARRIS.

CHARLOTTE, TENN., *August 22, 1865.*

DEAR SIR: In compliance with the proclamation of his excellency Governor W. G. Brownlow, of August 11, 1865, I herewith submit to you my report.

To interrogatory first. I issued no certificates without proof under oath that the applicant came within the provisions of the first section of the franchise act.

Second. Did you or your deputies issue certificates upon the oath of the applicant alone?

I suppose we issued about fifty or sixty upon the oath of the applicant alone;

and all others issued by me or my deputies were issued upon proof made under oath by a witness introduced by the applicants, except those who were known to me as unconditional Union men.

Very respectfully,

S. M. BINKLY,
Clerk of Dickson County.

Hon. A. J. FLETCHER,
Secretary of State.

I, Andrew J. Fletcher, secretary of state of the State of Tennessee, do hereby certify that the foregoing are correct copies of the original returns of the sheriffs of the counties composing the sixth congressional district of the State of Tennessee, of an election held in said district on the 3d day of August, 1865, for member of Congress, and of the governor's proclamation and the responses thereto of the clerks and sheriffs of said counties as to the manner in which said elections were held; and that the printed slips, marked 1, 2, and 3, are copies of franchise law and the governor's proclamations concerning the same. I also certify that the answer of the sheriff of Humphreys county has been mislaid or lost, and that said answer stated that the judges of election in seven districts were not sworn according to the franchise law, and that in three they were sworn, and that in the seven districts in which the judges were not sworn, Thomas received 188 votes, and Arnell none. I think said paper was copied into the transcript furnished to the Hon. D. B. Thomas, and will there be found.

In testimony of all which I have hereunto subscribed my official signature, and, by order of the governor, affixed the great seal of the State of Tennessee, at the department in the city of Nashville, this 2d day of December, A. D. 1865.

[SEAL.]

A. J. FLETCHER,
Secretary of State.

A BILL to be entitled an act to limit the elective franchise.

Whereas the first article and the first section of the declaration of rights in the constitution of the State of Tennessee declares, "that all power is inherent in the people; and all free governments are founded on their authority and instituted for their peace, safety, and happiness, and for the advancement of these ends, they have at all times an inalienable and indefeasible right to alter, reform or abolish the government in such a manner as they may think proper;" and whereas a large and respectable convention of the free and loyal people of the State of Tennessee met in the city of Nashville, on the 9th day of January, 1865, and proposed certain alterations and amendments to the constitution of the State of Tennessee, for rejection or ratification by the loyal people on the 22d February following; and whereas said amendments and schedule were solemnly ratified with great unanimity by the authoritative voice of the people; and whereas the eighth section of said schedule provided for the election of a governor and members of the legislature on the 4th day of March, 1865, and who, in accordance therewith, were elected by the ballots of the loyal people; and whereas the same authoritative voice, in section ninth of the schedule, delegated to the general assembly, meeting first under their amended constitution, the right to fix the qualification of voters and the limitation of the elective franchise; therefore, acting faithfully under and in accordance with this delegation of supreme power:

SEC. 1. *Be it enacted by the general assembly of the State of Tennessee,* That the following persons, to wit: Every free white man twenty-one years of age, a citizen of the United States, and publicly known to have entertained unconditional Union sentiments, from the outbreak of the rebellion until the

present time; and every free white young man, an inhabitant of the State, and citizen of the United States, arriving at the age of twenty-one years since March 4, 1865, provided that he has not engaged in armed rebellion against the authority of the United States, and every free white man of lawful age, coming from another State, and a citizen of the United States, on proof of loyalty to the government of the United States, and being a citizen of the county wherein he may offer his vote six months preceding the day of election; every free white man, an inhabitant of this State, and a citizen of the United States, who has served as a soldier in the army of the United States, and has been or may be hereafter honorably discharged therefrom; and every free white man who voted at the presidential election in November, 1864, or voted the 22d February, 1865, or voted on the 4th of March, 1865, in this State, shall be entitled to exercise the privileges of the elective franchise.

SEC. 2. *Be it further enacted*, That all other persons except those mentioned in section 1 of this act are hereby and henceforth excluded and denied the privileges of exercising the elective franchise in this State, for the space of six years from and after the passage of this act.

SEC. 3. *Be it further enacted*, That all persons embraced in section 2 of this act, after the expiration of said six years, may be readmitted to the privileges of the elective franchise, by petition to the circuit court or chancery court, and on proof of loyalty to the United States, in open court, upon the testimony of two or more good and loyal citizens of the United States.

SEC. 4. *Be it further enacted*, That it shall be the duty of the county court clerk in each county to open and keep a registration of voters, and before whom proof (in accordance with article 1 of this act) shall be made; and upon making said required proof, he shall issue to said person a certificate of registration; and that no one shall be permitted to vote unless so registered.

SEC. 5. *And be it further enacted*, That any voter may be challenged by any admitted voter of section 1 of this act, on offering his vote, and thereupon the judges of elections shall peremptorily administer to the person so challenged, before permitting him to vote, the following oath; said oath also to be taken by all judges of elections and candidates for office.

OATH.

I solemnly swear that I will henceforth support the Constitution of the United States, and defend it against the assaults of all its enemies; that I am an active friend of the government of the United States; that I will heartily aid and assist the loyal people in whatever measures may be adopted under the Constitution of the United States, and under all laws and proclamations made in pursuance thereof, to establish the national authority over all the people of every State and Territory embraced in the national Union; and that I will faithfully and most heartily support and defend the constitution of the State of Tennessee, and the amendments and schedule thereunto appended and adopted by the people on the 22d day of February, 1865, and also all acts of the general assembly, assembled in accordance therewith; and that I take this oath freely, voluntarily, and without mental reservation. So help me God.

SEC. 6. *And be it further enacted*, That any person taking this oath falsely shall be guilty of perjury, and shall suffer all the pains and penalties attached to that crime.

A BILL to fix the qualification of voters.

SECTION 1. *Be it enacted by the general assembly of the State of Tennessee*, That every free white man of the age of twenty-one years, being a citizen of the United States, and a citizen of the county wherein he may offer his vote six

months next preceding the day of election, shall be entitled to vote for members of Congress, governor of the State, members of the general assembly, judges of the supreme and inferior courts, and other civil officers of the county or district in which he resides: *Provided* he has not been convicted of the crime of treason, or other crime that renders him infamous; *and provided further*, he will take and subscribe the following oath:

I———, of the county of ——, State of Tennessee, do solemnly swear, in the presence of Almighty God, that I will henceforth faithfully support, protect, and defend the Constitution of the United States, and the Union of the States thereunder; and that I owe my allegiance to the government of the United States, as the supreme law of the land; and that I will in like manner abide by and faithfully support all acts of Congress passed during the existing rebellion having reference to slaves, so long or so far as not repealed, modified, or held void by Congress, or by the decision of the Supreme Court; and that I will in like manner abide by and faithfully support all proclamations of the President made during the existing rebellion with reference to slaves, so long and so far as not modified or declared void by the decision of the Supreme Court; and that I will in like manner faithfully support the constitution of the State of Tennessee, including the amendments adopted by the people of the State on the 22d day of February, 1865, as well as all the acts and resolutions of the general assembly of the State, assembled under and by virtue of the schedule and resolutions adopted at the same time, so long and so far as not modified or repealed by subsequent legislation, or declared void by the supreme court of the State. So help me God.

SEC. 2. *Be it further enacted*, That this oath may be taken before the clerks of the county courts of the several counties in the State, previous to the day of election at which the citizen proposes to vote; and his certificate of the fact will be sufficient evidence on which the vote may be received; and it may also be taken on the day of election before the officer holding the election, who is hereby empowered to administer the same to any voter who does not produce the certificate of the clerk of the county court that he has already taken the oath before him.

SEC. 3. *Be it further enacted*, That any person who shall wilfully violate his oath so taken shall be guilty of perjury, and on conviction shall be punished as prescribed by the laws of the State.

SEC. 4. *Be it further enacted*, That the oath hereinbefore prescribed shall not be required of the citizens who are well known to the judges of the election to have been unconditional Union men; nor shall it be required of the soldiers in the United States service, who are at the time in actual service, or who have been honorably discharged, and who are now by law entitled to vote.

SEC. 5. *Be it further enacted*, That all persons who are or shall have been officers or agents of the so-called confederate government; all who have left judicial stations under the government of the State of Tennessee, or under the United States to aid the rebellion; all who are or shall have been military or naval officers of said so-called confederate government, or of the State government under rebel rule, above the rank of colonel in the army, or of lieutenant in the navy; all who left seats in the United States Congress to aid the rebellion; all who were members of the legislature of the State which passed the ordinance of secession, and who by their votes and subsequent conduct showed that they wilfully and deliberately aided, assisted, and encouraged the rebellion; and the governor, comptroller, treasurer, and secretary of state, who wantonly aided and assisted and encouraged the rebellion, and all who have engaged in any way in treating colored persons or white persons in charge of such otherwise than lawfully as prisoners of war, and which persons may have been found in the United States service, as soldiers, seamen, or in any other capacity, shall be deprived of the privilege of the elective franchise in casting their votes at

any election that may be hereafter held in this State, unless they shall be restored to the same by subsequent legislation, or by judgment of the circuit court, and upon petition and testimony showing that the applicant has been specially pardoned by the government of the United States, and restored to all of his rights as a citizen, and that from his conduct and conversation it is apparent that it would be right and proper that he should be restored to the privilege of the elective franchise.

SEC. 6. *Be it further enacted*, That so long as any of the citizens of Tennessee, who by this act are entitled to exercise the elective franchise, shall be connected with the army of the United States, or with the militia force of the State in actual service, the governor shall issue writs of election to the commanding officers of such brigades, regiments, or detachments of Tennessee soldiers, wherever located, who shall open and hold the election, and receive the votes of their respective commands, and return the same to the secretary of state, and which shall be counted in the same way and manner as if said votes had been cast in any of the counties of the State to which said soldiers respectively belong.

SEC. 7. *Be it further enacted*, That the power is reserved to alter, amend, or change the provisions of this act, at any time when in the opinion of the general assembly of the State it is right and proper so to do.

SEC. 8. *Be it further enacted*, That this act shall take effect from and after its passage.

An act to preserve the purity of the ballot-box and punish treason.

SECTION 1. *Be it enacted by the general assembly of the State of Tennessee*, That all persons who have been engaged in open and treasonable war against the government of the United States, or the State of Tennessee, or who were guilty of aiding or abetting in the attempted overthrow of either or both of said authorities, shall be forever disfranchised, and disqualified from holding any office of honor, trust, or profit within the State of Tennessee: *Provided*, That if any person shall feel himself aggrieved by the passage of this act, he may file a petition in the circuit court of the county in which he has most usually resided during the rebellion, or resided since the passage of this act, setting forth the grounds of his complaint, concluding with a prayer to be restored to citizenship. And if the court, or court and jury, if petitioner desires a jury, are of opinion, after hearing the proof of two or more loyal, truthful citizens, that petitioner has been, from the commencement of the rebellion, as well as up to the time of determining said cause, a rebel of moderation, not violent or oppressive towards his neighbors, then, and in that event, the court trying the cause shall restore said petitioner to all the rights of a loyal citizen of the State of Tennessee. But if the jury trying the cause shall decide adversely to petitioner, then the court shall dismiss said petition, and applicant shall pay all cost of said cause, whether he be successful or not in his said suit: *Provided further*, That either party may have the right of appeal.

SEC. 2. *Be it further enacted*, That no person who has served in the army of the United States, and been honorably discharged, or who now is in actual service, shall be included within the operations of this act.

SEC. 3. *Be it further enacted*, That the provisions of this act shall not be construed so as to apply to any loyal citizen who was influenced or induced to go into the rebel army by and under the operations of the conscript law, or took an oath to support the so-called Confederate States of America.

[Nashville Union, November 14, 1865.]

Case of Mr. Etheridge.

The following is the result of the Etheridge trial :

HEADQUARTERS MIL. DIV. OF THE TENNESSEE,
Nashville, Tenn., November 6, 1865.

General Orders No. 34.

I. Before a military commission, convened at Columbus, Kentucky, in pursuance of Special Orders No. 91, paragraph III, from these headquarters, dated Nashville, Tennessee, September 26, 1865, and of which Brevet Colonel N. A. Dudley, United States army, is president, was arraigned and tried Emerson Etheridge, citizen of Tennessee.

Charge 1. Encouraging resistance to the enforcement of the laws.

Specification 1. In this, that on or about the 1st day of July, 1865, at the town of Dresden, Weakly county, Tennessee, Emerson Etheridge, citizen of the State of Tennessee, was present at a public assembly, and acted and united with other disloyal men in publishing and adopting the following treasonable and incendiary resolutions, to wit : " And whereas during the early part of the present year 1865, a few desperate political and pecuniary adventurers, (meaning thereby the loyal and lawfully constituted constitutional convention of the State of Tennessee,) assembled mainly from the military camps in and out of the State of Tennessee, met in the city of Nashville, and inside the fortifications which had been erected by the federal government professedly for the purpose of maintaining and enforcing the laws ; and whereas said persons so assembled, fraudulently, and without the knowledge or consent of nineteen-twentieths of the people of said State, then and there proceeded to subvert and abolish the most important provisions of the constitution of said state, (including the main provisions of the bill of rights, which are excepted out of the general powers of government ;) and whereas William G. Brownlow, since that time, has usurped the office of the governor of said State, and certain other persons have usurped the places of senators and representatives in the legislature, and claiming to be the general assembly of said State, have declared themselves ' a permanent body until October, 1867,' although the constitution and laws of said State, in full force for more than thirty years, provide for an election for a governor and a legislature the first Thursday in August, 1865 ; and whereas said legislature have promulgated certain illegal, unconstitutional, revolutionary, and despotic decrees in the form of statutory laws, and its members are now boasting that they can successfully invoke the military power of the United States to enforce these pretended laws upon the loyal people of the State, without their consent, in opposition to their wishes, and in palpable violation of the laws of the United States, and of the State of Tennessee, therefore

" *Resolved*, That the persons composing said self-constituted convention and legislature, and said Brownlow, in the judgment of the union men composing this meeting, are scarcely less treasonable, revolutionary, and lawless than were the original authors and instigators of the rebellion ; and that should the federal government use the army placed under its control for the sole purpose of suppressing the rebellion in aid of the scheme of these usurpers, who have thus attempted the overthrow of the constitution and laws of the State, then, and in that event, the federal government will have met a bold rebellion by a cowardly usurpation, and will have sanctified the treason of the rebels by the dastardly despotism inaugurated by itself."

The said Emerson Etheridge and his disloyal associates thereby endeavoring to bring reproach upon the State and national government, to create among the

people a rebellious and revolutionary spirit, and to incite them to armed resistance to the enforcement of the laws.

Specification 2. In this, that at the time and place herein below written, Emerson Etheridge, citizen of the State of Tennessee, did write and forward a communication, of which the following is an extract, to wit :

“ DRESDEN, *Tennessee*, June 27, 1865.

“ These things alone (law, order, etc., etc.,) can bring us an old-fashioned fourth of July ; and when that period does come, we will, I am sure, be much happier than we now are, with no law but force, and no semblance of civil government, State or federal, but usurpation enforced by the bayonets of negroes.

“ Very truly, yours,

“ EMERSON ETHERIDGE.

“ To F. HALE, Esq., *Union City.*”

Charge 2. Inciting sedition and insurrection.

Specification 1. In this, that Emerson Etheridge, citizen of Tennessee, when addressing a large assembly of citizens at Trenton, Tennessee, on the 3d day of July, 1865, made use of incendiary and inflammatory language, in words substantially as follows, to wit :

“ When the tax collectors, who have been appointed by the present bogus legislature (meaning thereby the loyal and lawful legislature of the State of Tennessee) come around to collect taxes, shoot them down, but don't tell any one I told you to do it.”

Specification 2. In this, that Emerson Etheridge, citizen, when engaged in haranguing a mass meeting of citizens of Trenton, Tennessee, on the 3d day of July, 1865, made use of incendiary and disloyal language, in words substantially as follows, to wit :

“ The negroes are no more free than they were ten years ago ; and if any one goes through the country telling them they are free, shoot him, and these negro troops, commanded by low and degraded white men, going through the country ought to be shot down.”

The said Etheridge thereby publicly inciting and urging the people to armed resistance to law, renewed acts of hostility against the government, and attempting to bring disgrace upon the national army.

Specification 3. In this, that Emerson Etheridge, citizen, while violently haranguing a large public assembly at Trenton, Tennessee, July 3d, 1865, made use of language in substance as follows :

“ Jeff. Davis is a mean man, and I can prove that Brownlow and Johnson (meaning thereby W. G. Brownlow, the honorable governor of Tennessee, and his excellency Andrew Johnson, President of the United States) are still meaner than he is. Judas sold himself for thirty pieces of silver, but Johnson sold himself for greenbacks, and Lincoln (meaning thereby the late President of the United States) has deceived me and lied to me.”

The said Etheridge thus attempting to incite the people of Tennessee to re-inaugurate revolution and bloodshed, endeavoring to hold up to infamy the chief magistrate of the State and nation, and even insulting the revered memory of Abraham Lincoln, the late lamented President.

To which charges and specifications the accused pleaded as follows :

To the second specification, first charge, guilty.

To all the other specifications and the charges, not guilty.

FINDINGS.—Of specification 1st, charge 1st, not guilty, except the words, publishing and adopting the following resolutions, and being present at the town of Dresden, Weakly county, Tennessee.

Of specification 2d, charge 1st, guilty, but attach no criminality.

Of charge 1st, not guilty.

Of specification 1st, charge 2d, not guilty.

Of specification 2d, charge 2d, not guilty, except the words "the negroes are no more free than they were forty years ago," and attach no criminality to these words.

Of specification 3, charge 3, guilty, except the words, "the said Etheridge thus attempting to incite the people of Tennessee to reinaugurate revolution and bloodshed, endeavoring to hold up to infamy the Chief Magistrate of the nation, and even insulting the revered memory of Abraham Lincoln, the late President of the United States of America."

Of charge second not guilty.

And the commission do acquit him, the said Emerson Etheridge.

II. The proceedings of the military commission in the case of Emerson Etheridge, a citizen, are disapproved by the major general commanding for the following reasons :

It appears from the record that upon the convening of the commission the judge advocate summoned such witnesses as were deemed necessary to support the prosecution, but before one-third of these witnesses were examined the following entry was ordered to be made in the record :

"The commission then went into secret session and decided to close the case."

The judge advocate presented and entered in the proceedings a protest against this summary action of the commission, upon the ground that many of the most important witnesses for the government (named in the protest) were not examined, and that he had good reasons for believing that by these witnesses he could prove material facts in the case, his knowledge of their testimony being based upon their affidavits, already in his possession.

Notwithstanding the protest of the judge advocate the commission proceeded to make its findings and adjourned.

This act of the commission was unauthorized and without precedent. It is the province of a court to sit in judgment and to investigate with patience and dignity the evidence brought before it, but not to reject without consideration the material testimony upon which its judgment should be based.

The commission also committed a grave error in attaching no criminality to the findings upon some of the specifications of which the accused was proved guilty by the limited amount of testimony which it condescended to permit the judge advocate to introduce.

The record and findings show that the accused, in time of rebellion, (or during the unsettled state of society immediately following it,) and in the midst of a notoriously disloyal assembly, denounced the President and commander of the armies of the nation as a usurper, a liar, a man meaner than Judas Iscariot, and declared also that there was no semblance of civil government in the land but usurpation, and that the laws were void and not binding, and yet the court attach no criminality to it.

Thus officers of the army composing a military tribunal and holding commissions from the commander of the armies of the United States see him so defamed, his authority set at naught, his usefulness impaired, and yet find nothing in all this to condemn.

The commission evidently failed to appreciate the grave nature of the case brought before it, and to manifest a due respect for the dignity and interest of the government it represented, and instead of being an instrument of justice and the guardian of the military authority it was appointed to uphold, by its arbitrary and inconsiderate action has enabled Emerson Etheridge to succeed in his attempt to do as much injury as possible to the government without subjecting him to personal harm.

Although the court has failed to do justice, and the evidence and findings clearly establish the guilt of the accused, yet, as the present state of society in West Tennessee does not require that further action should be taken in this case

or further restraint placed upon the accused, the court will not be reconvened for the reconsideration of its findings upon the evidence before it, and Emerson Etheridge will be immediately released from his parole and set at liberty.

The military commission, of which Brevet Colonel N. A. Dudley is President, is hereby dissolved.

By command of Major General Thomas,

WM. D. WHIPPLE,
Assistant Adjutant General.

STATE OF TENNESSEE, *county of Davidson, ss :*

Jacob J. Noah, being duly sworn according to law, deposes and says that he is a lawyer, residing in Maury county, in said State; that he is familiar with the state of public sentiment in Tennessee in reference to the act known as the "Act to limit the elective franchise," passed June 5, 1865; that the friends of this act, known as unconditional Union men, were denounced by the conservative or rebel element throughout the State; that this rebel element was openly violent and hostile to the enforcement of this law, for the reason that it operated to disfranchise them for their acts of rebellion; that it was everywhere publicly known and unconcealed that every persistent effort was to be made to have this law disregarded. The clerks of the county courts, who were the officers designated in the law to grant certificates, were pressed from every side of this rebel element to twist out of and evade the strict application of the law. Many of these county clerks favored this evasion of law, and the same was announced to the general assembly by the governor of the State in a report made by him to the said assembly, in obedience to a resolution of inquiry therefrom. In the county of Maury I saw certificates that had been given to ex-confederate soldiers, on parole and unpardoned, many of whom subsequently voted thereon. Deponent was informed, and therefore believes and states, that the county clerk construed the act limiting the elective franchise, as aforesaid, to include within it all those confederates who had behaved themselves since their surrender, without reference to their past participancy in the rebellion. I know of one ex-confederate who was tendered, but refused to receive, one of these certificates, as he felt bound to recognize the fact that the law had disfranchised him, and he considered himself bound to obey the law. These efforts made to disregard the law were open, notorious, and persistent, and as deponent is informed, believes, and states, the same spirit is now manifest, and as open and unconcealed. Deponent did not hear the speeches of Etheridge, Campbell, and others, but saw and read reports of same in the public prints. Judging from these reports, the speeches were of an incendiary and seditious character, and while condemned by the loyal people, were applauded by the conservative or rebel element. Deponent further states, on his information and belief, that the rebel element pronounced the law unconstitutional, and as such would not obey it. Deponent has since seen an opinion signed by Messrs. Fleming, Baxter, Brown, and Nelson, lawyers of Knoxville, wherein they hold the present law of franchise unconstitutional, and decide that the judges of election under the act were *judicial officers*, and as such undoubtedly had the authority to pass upon its constitutionality, and to obey or disregard it as they might deem proper. Deponent mentions this instance to show the persistent and notorious efforts made to evade and disregard this law.

J. J. NOAH.

Sworn to and subscribed before me, and reduced to writing in my presence, this twenty-second day of February, A. D. 1867.

L. C. HOUK,

Judge, &c., 17th Judicial Circuit, State of Tennessee.

We, W. R. Conner, T. A. Harris, John W. Hale, and Jesse Taylor, being sworn, say that we have perused the deposition of J. J. Noah made above, and that we are citizens of the State of Tennessee, loyal men, and that, upon personal knowledge, and the information and belief derived from contact and communion with the public, and a knowledge of the sentiment of the public thereupon, we corroborate the evidence given by said J. J. Noah, in reference to the attempts made by the rebel element to openly, notoriously, and persistently bring about a disregard of the franchise law of the State. We further state that we are well acquainted with said J. J. Noah, who has been one of the attorneys general of the State, and know he has had remarkable opportunities to know and be familiar with the state of public sentiment, by reason of his having filled said office of attorney general.

W. R. CONNER,
Commissioner of Registration for Maury County, Tennessee.
 T. A. HARRIS,
Justice of the Peace.
 JOHN W. HALE,
Commissioner of Registration for Lewis County.
 JESSE TAYLOR,
Commissioner of Registration for Perry County.

Sworn to and subscribed, and reduced to writing in my presence, this twenty-second day of February, A. D. 1867.

L. C. HOUK,
Judge, &c., 17th Judicial Circuit, State of Tennessee.

STATE OF TENNESSEE, *County of Davidson:*

James Mullins, J. A. Fuson, W. Y. Elliott and William Wines, being each for himself duly sworn, deposes and says that he was and now is a member of the house of representatives of the State of Tennessee; that he was present in the hall of the house of representatives in the capitol of said State, at Nashville, and participated in the deliberations therein had upon the franchise law and the passage of the act known as, "an act to limit the elective franchise," passed June 5, 1865; that the issue was distinctly made during the deliberations and discussions had then and there upon said act as regards the propriety of proving loyalty by the oaths of competent witnesses, or by the oaths of the persons applying for certificates without further proof; that we insisted that it would be necessary, proper and just to compel certain proposed voters to prove their right and competency to vote by evidence other than their own oaths, making proof of loyalty the test for suffrage; that the opposition party, known as copperheads, contended violently and strongly for a proposition or enactment that permitted proposed voters to the right of suffrage upon their own oaths, unsupported by any other testimony. After a severe parliamentary struggle our proposition prevailed, and the act known as the "act to limit the elective franchise," passed June 5, 1865, became the law, wherein it was required that proof of loyalty must be established by the testimony of two voters other than the applicant. The distinction between the bills, as advocated by the Hon. Edmund Cooper and Hon. Samuel M. Arnell, (who were then both members of the house of representatives of the general assembly of the State of Tennessee,) was that Mr. Cooper desired to provide for requiring only the oath of the applicant himself, while Mr. Arnell insisted that the proof of loyalty should

be made by competent witnesses in his behalf, and not left to the unsupported oath of the said applicant, but must be proved *aliunde*.

JAMES MULLINS,

Representative from Bedford and Rutherford.

J. A. FUSON,

Representative from De Kalb.

W. Y. ELLIOTT,

Representative of Rutherford Co.

WM. WINES,

Representative from Montgomery.

Sworn to and subscribed before me, and reduced to writing in my presence, this twenty-first day of February, A. D. 1867.

N. A. PATTERSON,

Judge Eighth Judicial Circuit of Tennessee.

THOMAS } Pending before the Committee of Privileges and Elections of the
vs. } House of Representatives in the Congress of the United States.
ARNELL. }

SIR: Take notice that in this case I shall take depositions at the office of the governor of Tennessee, in the State house at Nashville, commencing on the 21st instant, at 10 o'clock a. m., and to continue thereafter from day to day at the same place, if necessary, until finished.

Your obedient servant,

SAMUEL M. ARNELL.

Hon. D. B. THOMAS.

I, A. G. Riddle, being sworn, say, that I this day offered a copy of the above to Hon. Edmund Cooper, for the contestant, who refused to receive the same, and referred me to Mr. Thomas; that I called at the room of Mr. Thomas above-named, No. 134 Metropolitan hotel, Washington city, who was absent from his room, and I thereupon deposited said copy, with the key of his room, in his box in the office of said hotel.

A. G. RIDDLE.

Subscribed and sworn to before me February 16, 1867.

[SEAL.]

R. J. MEIGS,

Clerk.

Hon. D. B. THOMAS.

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BREAKWATER IN PORT AUSTIN.

RESOLUTION

OF

THE LEGISLATURE OF MICHIGAN,

ASKING FOR

An appropriation of money for the construction of a breakwater and light-house in the harbor of Port Austin.

FEBRUARY 25, 1867.—Referred to the Committee on Commerce and ordered to be printed.

Whereas there is no safe harbor of refuge for shipping and the protection of life and commerce on Lake Huron and Saginaw bay, between St. Clair river and the mouth of Saginaw river, a distance of one hundred and sixty miles; and whereas a safe, convenient, and commodious harbor can be created by the erection of a breakwater in the harbor of Port Austin, which would save to commerce the delay, and to life the danger, of seeking refuge sixty to one hundred miles away; and whereas the many dangerous reefs in the vicinity of the mouth of Saginaw bay, and the frequent recurrence of sudden and violent storms in that region have been the cause of many wrecks and great loss of life and property, which would, to a great extent, be avoided if a light-house were erected upon a lot now owned by the United States, and purchased by them for that purpose, at the harbor of Port Austin, on the northwest side of Pointe au Barque: Therefore,

Resolved by the Senate and House of Representatives of the State of Michigan, That our senators and representatives in Congress be requested to use their influence to secure an appropriation in money for the purpose of constructing a breakwater and light-house in the harbor of Port Austin, Michigan.

Resolved, That the governor be requested to transmit copies of the foregoing preamble and resolutions to each of our senators and representatives in Congress.

HENRY H. CRAPO.

BREAKWATER IN PORT ANGLE

REPORT

THE LEGISLATURE OF MICHIGAN

ASSEMBLED

the appropriation of money for the construction of a breakwater in the harbor of Port Angle.

Report of the Committee on Commerce and Fisheries.

Whereas there is no safe harbor at present for shipping and the protection of the commerce on Lake Huron and Lake Michigan, and the navigation of the Saginaw River, a distance of one hundred and fifty miles; and the mouth of the Saginaw River, and consequently the harbor can be reached by the entrance of a breakwater in the harbor of Port Angle, which would save to commerce the delay, and to the danger of wrecking, which is now incurred by the entrance of the Saginaw River, and the frequent occurrence of wrecks and violent storms in that harbor have been the cause of many wrecks and great loss of life and property, which would, to a great extent, be avoided if a light house was erected upon the point now owned by the United States and purchased by them for that purpose at the harbor of Port Angle, on the northwest side of Point au Harp; and

Resolved by the Senate and House of Representatives of the State of Michigan, That the Secretary and representatives in Congress be requested to see that the money to be appropriated for the purpose of constructing a breakwater and light-house in the harbor of Port Angle, Michigan, be expended, and that the Governor be requested to transmit copies of the foregoing report and resolutions to each of our senators and representatives in Congress.

JAMES H. CHASE

EQUALIZATION OF BOUNTIES.

RESOLUTION

OF

THE LEGISLATURE OF INDIANA,

INSTRUCTING

Their senators and representatives in Congress to use their influence to procure the passage of a bill equalizing bounties.

FEBRUARY 25, 1867.—Referred to the Committee on Military Affairs and ordered to be printed.

Whereas it is a fact apparent to all persons that many private soldiers who were engaged in the late war against the south, and also the families of many deceased soldiers, are now in limited, if not destitute, circumstances; and whereas the law on the subject of bounties makes an unjust discrimination between persons entitled thereto, in regard to the amount of the same: Therefore—

Be it resolved by the senate, (the house concurring,) That our senators in Congress be instructed, and our representatives be requested, to use their influence to procure the passage of an act for the equalization of the bounties of all persons entitled thereto under the provisions of any act of Congress on that subject.

Passed general assembly of Indiana February 20, 1867.

O. M. WILSON,

Secretary of the Senate.

EQUALIZATION OF BOUNTIES

RESOLUTION

OF

THE LEGISLATURE OF INDIANA

INTRODUCED

THAT SENATORS AND REPRESENTATIVES IN ASSEMBLY TO THE HOUSE AND TO SENATE
THE PURPOSE OF A BILL EQUALIZING BOUNTIES

INTRODUCED BY SENATOR J. H. HARRIS, OF MILWAUKEE, AND ORDERED TO BE
PRINTED

It is a fact apparent to all persons that many persons who
were engaged in the late war against the south, and also the friends of many
disfranchisement, are now in limited, their children, circumstances; and whereas
the law on the subject of bounties makes an unjust discrimination between persons
not entitled thereto, in regard to the amount of the same: Therefore—
That the Senate and the House (the House concurring) do hereby enact and ordain,
That the provisions of an act for the equalization of the bounties of all
persons entitled thereto under the provisions of any act of Congress on that
subject.

Passed and approved of Indiana February 20, 1888

O. M. WILSON

Secretary of the Senate

UTAH TERRITORY.

RESOLUTION

OF

HON. JOHN BIDWELL,

RELATIVE

To affairs in Utah Territory.

FEBRUARY 25, 1867.—Referred to the Committee on Territories and ordered to be printed.

Resolved, That the Committee on Territories be instructed to inquire into the necessity of having a larger military force stationed in Utah Territory in order to protect the people against Indian hostilities and other outrages; to preserve order when the civil authority shall fail or prove inadequate to any condition or emergency demanding such aid; and, generally, to secure the execution of the laws of the United States in said Territory. Also, what additional number of troops and what legislation, if any, are required to accomplish the objects above named, and meet the wants and condition, present as well as prospective, of said Territory.

JEFFERSON BARRACKS, MISSOURI, *February* —, 1867.

DEAR SIR: Your letter of January 11, from Washington, requesting a report of my observations upon affairs in Utah while there in October last, is received, and the following is submitted as a summary of facts that appeared most prominent:

The Mormons reached Utah nineteen years ago last autumn, numbering about five thousand men, women, and children. They now number, in the Great Basin, about one hundred thousand. Their ratio of increase is an increasing one; that is, the proportional increase to their number is each year greater. Last season they brought from abroad about five thousand. The number they bring on is only limited by their ability to care for them until they become self-supporting. Their systems, in this respect, as well as in everything else, seems very complete. The newly arrived families are subsisted the first winter from the "church tithe," during which time their farms are surveyed and apportioned, material secured for buildings, seed and teams furnished, and in the spring each goes quietly and industriously at his own work on his own apportioned land. Their settlements are principally along the foot of the west slope of the Wasatch mountains; but in the south of Utah they reach across it, and near the Colorado river. This strip is nearly six hundred (600) miles long from north to south, is composed of numerous narrow valleys, and if all the tillable land could be put

in one piece it would not exceed, nor vary far from, ten miles in width the entire length. By taking in all the agricultural lands to the Sierra Nevadas, not including mineral lands, the area that can be cultivated may be doubled, but not more. I think we now have a limit to their expansion, granting that they cannot get a footing in California, nor in the mining and pastoral countries of Montana and Idaho. Belgium supports one person to $1\frac{6}{10}$ acres of arable land. The Grand Duchy of Baden supports one to $2\frac{7}{10}$ of her whole area, while Bavaria supports one to four acres of her entire area. Taking the limit of Utah at one to every two acres of its tillable land, we have a limit of about four millions as the maximum of their ability for expansion without encroachments, which can hardly be considered probable. Their wealth and influence, I believe, will enable them to absorb all the agricultural lands in the Great Basin whenever they may need it.

No agriculture is possible without artificial irrigation. The numerous bold springs from the Wasatch and other mountains, and Bear and other rivers, which can be taken out of their beds, will enable them to irrigate about the amount of land before described, but not more; in fact, the amount of land they can cultivate depends entirely on their ability to irrigate. They have very little timber, but are finding coal and excellent stone for building purposes, and this lack will be no hindrance to their prosperity. Their lands raise the small grains, fruits, and nearly all vegetables in the greatest profusion; while their flocks of sheep, herds of cattle and horses, show a great degree of success in stock-raising. They are now producing an abundance of sorghum sugar, and cotton-raising in the south of the Territory has been successful. The laboring people are nearly all foreigners, who have brought with them their close systems of agriculture, and they invariably evince a remarkable earnestness in their work and faith.

I would call their government a theocratic despotism. Brigham Young—or as he is called there President Young—is at the head of church and state, and is the supreme and absolute ruler in everything, temporal and spiritual. The civil officers of our government appointed there have no power whatever, and their positions I found in the highest degree contemptible. I conversed freely with nearly all of them. They were fully conscious of their insignificance.

The church (which is also the state) is very completely organized, with a system of high councilmen, bishops, priests, and wardens, that extends to every hamlet, and controls the actions and influences the thoughts of every individual. From the pulpit the people are directed how to sow their crops, how to worship God, and for whom to vote—all in the same sermon. Implicit obedience is their first rule.

I found Brigham Young a man of remarkable shrewdness, administrative ability, and information. He watches closely all new-comers till he knows their purposes. The Mormon people believe him to be a true prophet of God; idolize him with a true devotion; would sacrifice all their earthly possessions and follow him pennyless to any quarter of the globe, or would commit any crime at his bidding. My interview with him was pleasant, he talking freely upon all his plans. He has the past season constructed a line of telegraph to every village in Utah, and is ready to build several hundred miles of the Union Pacific railroad. I also found his principal advisers—General Wells, Heber Kimball, and Q. Canon—able and indefatigable men. I found at Salt Lake City about three hundred of our own people, whom they term Gentiles, nearly all traders. They had established a church, a newspaper, and a school; and I was informed at one time they exerted some influence there, but at the time of my visit they were broken up into several factions, probably brought about by the ingenuity of the Mormons, and their influence was scarcely perceptible. I notice since, the Mormon church has prohibited trade with them, and negotiations have been talked of to sell everything out to the Mormons, and leave the country. There

is a garrison of troops there, but at present there is no practical way of making their influence felt. Ben Holliday I believe to be the only outsider acceptable to those people, and to benefit himself I believe would throw the whole weight of his influence in favor of Mormonism. By the terms of his contract to carry the mails from the Missouri to Utah, all papers and pamphlets for the news dealers, not directed to subscribers, are thrown out. It looks very much like a scheme to keep light out of that country, nowhere so much needed.

The Mormons believe that they are the chosen people of God—are His latter-day saints—that their country is Zion; and that they have a great and holy destiny; that our national troubles the past six years are punishments of God for persecutions of *them*; and that He will continue to afflict us till we are destroyed and they rule the land. This is preached to them every Sunday, (I heard it on two occasions,) and is believed by all, and has engendered in them the strongest hatred to our government.

The curses of God are evoked every Sabbath upon the memories of Presidents Polk and Buchanan and Thomas Benton, whom they conceive to have been their special persecutors.

Their temporal prosperity is a marvel. Their wealth commenced with the breaking up and withdrawal of the Johnston army from Camp Floyd by the orders of Secretary Cameron, which also directed the sale or abandonment of the property of the post. This resulted effectually in turning over to the Mormons some five or six millions of property. The discovery of the mines in the neighboring Territories soon after, and the quartering there of a volunteer army, have given such fine markets for their abundant surplus as to have made them in the aggregate very wealthy. They are probably the most universally industrious and law-abiding people on the continent; drunkenness and theft are very uncommon. Crimes against us is to them obedience.

I saw something of the practical workings of polygamy. Brigham Young's establishment and a few others of the wealthy leaders appeared little else than harems; that is, the women did not seem to be utilized for industry. The next class of men generally had four or five wives. Sometimes they possessed as many farms, with a wife to look after each, and sometimes they would all live together, each having her especial branch of domestic duties. The poorer men had one, two or three wives, according to their means, and arrangement seemed to be almost entirely utilitarian.

Originally polygamy seemed to have been introduced to more speedily populate their Territory with their own people, and there is a power in this best understood by studying the progress of the early Moors in Spain, and partially from sensual reasons, there being no preventing power.

Its effects on cultivated society would be to degrade it, especially the women, but with the people of Utah it appears only to retard culture, they being originally found very low in the moral scale. Whenever women there become sufficiently cultivated to appreciate the true dignity of a lady, they at once renounce polygamy. A few renounce it every year, but the leaders know how strongly their power is fortified by abject ignorance, and this gives them no concern. I do not consider polygamy a necessary part of their church creed, and if it becomes necessary to renounce it, they would probably find it convenient to get a revelation to dispense with it.

Were it practical, the policy of putting away the already supernumerary wives might be questioned, as it would take from them, and perhaps from their children, the natural support to which they are entitled. I do not presume to propose any practical means of reaching the institution. You cannot expect a juryman to convict himself, and if Utah is parcelled to the adjoining States and Territories and juries imported, I fear it will hardly meet the want. The hearts of these people must first be taught that it is to their best interests to give it up. This may be a slow process, but in my opinion the best one.

They are hospitable to all strangers, especially to government officials, and, if opportunities occur, are particularly ingenious in shaping their views to their own advantage. I found the internal revenue assessor of the Territory living with their congressional delegate, Mr. Hooper, and, it was believed, to some extent under Mormon influences; he was hardly known to the Gentiles, and not looked upon as on their side. While I was there he received the appointment of colonel in the army, and efforts were at once made to effect a transfer that would give him command of Camp Douglass.

General Connor, who commanded there during the war, I think, treated Mormonism too harshly, due probably to his zeal as a Catholic; yet he exercised a strong influence against Mormonism, and was a true man in the interests of the government, and any clamor or charges made against him for corruption there I believe to have had their origin with Mormon leaders, or their friends, to counteract his influence.

The murder of Doctor Robinson occurred while I was in Salt Lake City, and that of Brassfield some time previous.

There is no doubt of their murder from Mormon church influences, although I do not believe by direct command. Principles are taught in their churches which would lead to such murders. I have earnestly to recommend that a list be made of the Mormon leaders, according to their importance, excepting Brigham Young, and that the President of the United States require the commanding officer of Camp Douglass to arrest and send to the State's prison, at Jefferson City, Missouri, beginning at the head of the list, man for man hereafter killed as these men were, to be held until the real perpetrators of the deed, with evidence for their conviction, be given up. I believe Young, for the present, necessary for us there.

The forts that have been talked of about Brigham Young's place are nothing but high cobble-stone fences, which any one can make about his grounds. The military organizations of the Territory amount to nothing; they do not dream of arming against the United States; they are too shrewd to do so. They are, however, using a more subtle and many times stronger power against us, educating the hearts of rising generations. They will do nothing to give excuse for open force to be brought against them, and I believe their leaders would obey any mandate or arrest on the part of the United States, requiring no other force than to prevent escape by flight. They are loyal to the letter of our laws, but in spirit a separate and distinct nationality. They do not obey the laws of Congress prohibiting polygamy, but they say the Constitution grants them trial by a jury of their peers, whose decision is final, and they are all ready to be tried.

The government should be properly informed as to these people, hoping a remedy may in time present itself. I feel assured that no plan yet proposed will give to us a loyal Utah.

The railroad will help and strengthen them in place of solving the question. It will make it more easy to bring forward converts, and will add ten where it enlightens one. There is a depth of ignorance there that will take many generations of light to reach far into.

If we parcel out their Territory they still have their organization of the State of Deseret, with its legislature, which meets every year to act upon the doings of the lawful Territorial legislature. They are an industrious, agricultural people, and, in fact, do nothing for which war can be waged for their extermination, and they are too valuable a portion of the nation to destroy if they can be utilized; extermination cannot enter the discussion at our age of civilization. The theory that they will go to pieces when Young dies is fallacious; they will certainly provide for such a contingency. The same thing was believed when Joe Smith died, but look at results.

Any hope that their influence may be neutralized by attrition and contact, I

consider groundless; see how entirely they control and destroy all influences of the Gentile community now there. Look at their position geographically; there is between us and them a desert that can never be inhabited by a people of any strength, one thousand miles, and then the Rocky mountains; beyond, another desert six hundred miles in width, and then the Sierras. Such isolation on the maps of other countries is always coincident with separate nationality, and this is their ambition.

No one can be in Utah long without a feeling that they are among a foreign people. It is true they speak our language, but their religion is utterly different from ours, and has become, as respects themselves, a fixed one. They only acknowledge allegiance to us through protest, and then secondary to their own government, and they hate us with an unconcealed bitterness, and constantly pray in their churches for our downfall. With navigation established well up the Colorado, they will be in easy access to the world.

I think it important that the government in some way strengthen its authority there, at the same time increase, by whatever means possible, our friendly relations with those people, and elevate their intelligence, until they come to feel that they are a part of us, and that we are their friends. Harsh measures will only the more strongly consolidate them; it cannot much more deeply embitter them. But of all things, be awake to the real state of things growing up in the centre of our territory.

I was approached while there by parties whom I have reason to believe were friendly to Mormonism upon the subject of sending there a strong force of troops; this was to give them a market, of which they now feel in want. I do not conceive a large force of troops to be required there.

Brigham Young possesses three elements of strength—perfect organization, religious fanaticism, and despotic power; to use all these to the best advantage he has a strong and well-balanced mind.

The delegate in Congress is his exponent and instrument; although elected by votes, it is at his dictation, complying with the letter of the law but not the spirit.

They are now perfectly organized and established, their religion zealously felt, with an abundant resource of manual force, which will be brought forward as fast as it can be used. Their systems abroad for getting converts are very complete, nearly all of Europe being distriated, with Mormon marshals on the spot.

Their great success comes simply from taking a class so low that Mormonism, with its material benefits, is to them an advance in the scale of humanity. Such people are not difficult to find in Europe. The working of the machinery of their systems is complete, and their continued success beyond what but few have ever dreamed is insured by simply refraining to provoke the United States to take up arms against them.

The lands of the Territory are still held by government. If it is the intention to give actual title to Mormon occupants on the same grounds as to other emigrants, (and I do not see how we can do less,) a land office should be opened there, and a commissioner appointed to settle conflicting claims.

As a general thing, there will be little trouble, as they have a very correct land system of their own, made to conform to the government system.

The longer this is neglected the more trouble can be expected in reconciling claims.

I am, very respectfully, your obedient servant,

M. B. HAZEN,

Bvt. Maj. Gen. U. S. Army, Col. 38th U. S. Infantry.

Hon. J. BIDWELL,

House of Representatives.

ROCK ISLAND.

AN ACT

OF

THE LEGISLATURE OF ILLINOIS,

PROPOSING

To cede to the United States the jurisdiction over certain lands in Rock Island.

FEBRUARY 25, 1867.—Referred to the Committee on Commerce and ordered to be printed.

Be it enacted by the people of the State of Illinois represented in the general assembly, That jurisdiction over the island of Rock Island and the small islands contiguous thereto, known as Benham's, Wilson's, and Winnebago islands, and their shores, taken and assigned by the United States for the establishment of an arsenal and armory, be, and is hereby, ceded to the United States: *Provided,* That the commanding officer shall, on application of a competent State officer, allow the execution of all civil and criminal process, issued under authority of the State of Illinois, in said islands, in the same way and manner as if jurisdiction had not been ceded as aforesaid.

SECTION 2. *Be it further enacted,* That the islands before named, and the public buildings and other property that may be thereon, shall forever hereafter be exempted from all State, county, and municipal taxation and assessment whatever, so long as the same shall be used by the United States as an arsenal or armory.

F. CORWIN,

Speaker of the House of Representatives.

WM. BROSS,

Speaker of the Senate.

Approved February 1, 1867.

R. J. OGLESBY.

UNITED STATES OF AMERICA, *State of Illinois, ss :*

I, Sharon Tyndale, secretary of state of the State of Illinois, do hereby certify that the foregoing is a true copy of an enrolled law now on file in my office.

In witness whereof, I have hereunto set my hand and affixed the great seal of State, at the city of Springfield, this first day of February, A. D. 1867.

[SEAL.]

SHARON TYNDALE,

Secretary of State.

BOOK 181A

AN ACT

THE LEGISLATURE OF ILLINOIS

1857

To amend the Constitution of the State of Illinois in relation to the jurisdiction of the courts of the State.

Enacted at the City of Springfield, this first day of February, A. D. 1857.

Be it enacted by the People of the State of Illinois, represented in the General Assembly, That jurisdiction over the land of Rock Island and the small islands contiguous thereto, known as Johnson's, Wilson's and Winnebago Islands, and their shores, taken and assigned by the United States for the establishment of a naval and military base, and a harbor, vested in the United States; provided, That the commanding officer shall, on application of a competent State officer, allow the extension of all civil and criminal process, issued under authority of the State of Illinois, in said islands, in the same way and manner as if jurisdiction had not been ceded as aforesaid.

SECTION 2. Be it further enacted, That the islands before named, and the public buildings and other property that may be thereon, shall forever hereafter be exempted from all State, county, and municipal taxation and assessments whatever, so long as the same shall be used by the United States as an arsenal.

E. CORWIN,
Speaker of the House of Representatives.
WM. BROWN,
Speaker of the Senate.

E. J. BOYLE

Approved February 1, 1857.

THOMAS STATE OF ARIZONA, State of Illinois, as:
A. S. TYNDALE, Secretary of State of the State of Illinois, do hereby certify that the foregoing is a true copy of an enrolled law now on file in my office. In witness whereof, I have hereunto set my hand and affixed the great seal of the State of Illinois, this first day of February, A. D. 1857.
THOMAS TYNDALE,
Secretary of State.

HARBOR AT PENTWATER AND PÈRE MARQUETTE.

RESOLUTION

OF

THE LEGISLATURE OF MICHIGAN,

ASKING FOR

An appropriation of money for the construction of harbors at the mouth of Pentwater and Père Marquette rivers.

FEBRUARY 25, 1867.—Referred to the Committee on Commerce and ordered to be printed.

Whereas there are no safe harbors between Muskegon and the Manitou islands, a distance of over two hundred miles, on Lake Michigan, where our steamers and sailing vessels can lie in safety; and whereas the Pentwater and Père Marquette rivers empty into Lake Michigan between Grand Pointe au Sauble and Petite Pointe au Sauble, two of the most dangerous points upon the lake, and can be made safe and commodious harbors at a moderate expense: Therefore,

Resolved by the senate and house of representatives of the State of Michigan, That our senators and members of the House of Representatives in Congress be requested to use their best endeavors to obtain from Congress an appropriation in money to aid in constructing harbors at the mouth of the Pentwater and Père Marquette rivers.

Resolved, That the governor be requested to transmit copies of the foregoing preamble and resolutions to our senators and representatives in Congress.

HENRY H. CRAPO.

HARBOR AT PONTIAC AND PIER MARQUETTE

RESOLUTION

THE LEGISLATURE OF MICHIGAN

Resolved, That the sum of \$100,000 be appropriated for the construction of harbors at the mouth of the
river and Lake Huron.

Resolved, That the sum of \$100,000 be appropriated for the construction of harbors at the mouth of the
river and Lake Huron.

Whereas there are no safe harbors between Mackinac and the Manitowish
peninsula, a distance of over two hundred miles on Lake Michigan, where our
commerce and sailing vessels can lie in safety; and whereas the Leontine and
Leontine, situated at the mouth of the Saginaw River, is the only harbor on the
peninsula and Lake Huron, and the most dangerous point upon the
lake, and can be made safe and commodious harbors at a moderate expense;

Therefore, the Senate and House of Representatives of the State of Michigan,
in joint session, do hereby enact, that the sum of \$100,000 be appropriated for the
construction of harbors at the mouth of the Saginaw River, and at the mouth of the
Leontine River, and for the purchase of land for the same, and for the construction
of a breakwater at the mouth of the Saginaw River, and for the purchase of land for the same,

That the Governor be and he is requested to transmit copies of the foregoing
resolutions to our several and representative in Congress.

Approved: 1850, January 1st, at Lansing, Michigan.
HENRY H. CLARK, Speaker.

SURVEY OF ALPENA HARBOR.

RESOLUTION
OF
THE LEGISLATURE OF MICHIGAN,
ASKING FOR

An appropriation of money for survey of harbor of Alpena, at mouth of Thunder Bay river, for building light-house, and making other improvements thereat.

FEBRUARY 25, 1867.—Referred to the Committee on Commerce and ordered to be printed.

Whereas there are in the northeastern part of this State several good natural harbors, requiring but small appropriations from the general government to make them accessible and valuable harbors and commercial points; and

Whereas the commerce of all the States bordering on the northwestern lakes would be promoted and protected by the improvement of one or more of said harbors: Therefore,

Resolved by the senate and house of representatives of the State of Michigan, That the Congress of the United States are hereby requested to cause such surveys and estimates to be made of the harbor of Alpena, at the mouth of Thunder Bay river, as will enable Congress to make available an appropriation for building a light-house and completing the improvements on said harbor at an early day, and also to make an appropriation in money therefor.

Resolved, That the governor be requested to cause copies of these preambles and resolution to be forwarded to each of our senators and representatives in Congress.

HENRY H. CRAPO.

THE HOUSE OF REPRESENTATIVES
OF THE STATE OF ALABAMA
IN SENATE SESSION
Held at the City of Montgomery
January 14th 1891

REPORT OF THE
COMMISSIONER OF THE
LAND OFFICE

FOR THE YEAR
ENDING DECEMBER 31st 1890

THE COMMISSIONER OF THE
LAND OFFICE

JOHN W. HARRIS

The Commission of the Land Office for the year ending December 31st 1890, has the honor to submit to the Senate the following report. The Commission has the pleasure to announce that the Land Office has been organized and is now in the full enjoyment of its duties. The Commission has the honor to acknowledge the many favors and courtesies extended to it by the Senate and the Executive Department. The Commission has the honor to acknowledge the many favors and courtesies extended to it by the Senate and the Executive Department. The Commission has the honor to acknowledge the many favors and courtesies extended to it by the Senate and the Executive Department.

HENRY H. HARRIS

SOLDIERS OF THE WAR OF 1812.

RESOLUTION

OF

THE LEGISLATURE OF NEW YORK,

RELATIVE TO

Pensions for soldiers of the war of 1812.

MARCH 2, 1867.—Referred to the Committee on Invalid Pensions and ordered to be printed.

Resolved, That our senators and representatives in Congress be requested to urge the enactment of a law granting a reasonable pension to the surviving soldiers of the war of eighteen hundred and twelve, as some recognition of the faithful services rendered by them to their country in that contest.

SOLDIERS OF THE WAR OF 1812

JOHN M. HARRIS

RESOLUTION

THE LEGISLATURE OF NEW YORK
BOARD OF TRADING

Passed for adoption by the House of Representatives

The Senate of the State of New York, on the 1st day of January, 1850, passed the following resolution, to wit:

Resolved, That the sum of \$100,000 be appropriated for the purpose of purchasing the services of the soldiers of the War of 1812.

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DES MOINES RAPIDS.

RESOLUTIONS

OF THE

BOARD OF TRADE OF SAINT LOUIS,

IN REGARD TO

The height of the Mississippi river at the Rock Island and Des Moines rapids.

FEBRUARY 28, 1867.—Referred to the Committee on Commerce and ordered to be printed.

ROOMS OF THE BOARD OF TRADE OF SAINT LOUIS,
Saint Louis, February 25, 1867.

SIR: At a meeting of the Saint Louis Board of Trade, held on the 18th instant, the following preamble and resolutions were adopted, and a copy thereof ordered to be forwarded to the Speaker of the House of Representatives:

Whereas the River Improvement Convention, which assembled in this city on the 12th instant, composed of representatives of thirteen States bordering on the Mississippi and its tributaries, from Minnesota to Louisiana, and from Pennsylvania to Nebraska, by a unanimity which only a common and imperative necessity and interest could secure, expressed the conviction that water transportation is the cheapest for meeting the immense and rapidly increasing products of the Mississippi valley, and the only mode which is able to afford facilities adequate to the demands of commerce; and whereas this great mediterranean river, both in war and peace, has been found of the utmost importance to the government and to the people: Therefore, be it

Resolved by the Saint Louis Board of Trade, That the action of the convention, recognizing the improvement of the Mississippi at the Rock Island and Des Moines rapids as a national work which demands, and should receive, the most favorable consideration of the Congress of the United States, is fully indorsed by this board.

Resolved, That as this great natural channel of trade and commerce exercised a powerful influence in preventing the dismemberment of the Union, this board believes—and every enlightened statesman will recognize the soundness and naturalness of the reasons for that faith—that the mutual interchange of the varied and important productions and commodities of the north temperate zone, through the greater portion of which prolific region the sweep of this stream extends, and the inter-communication the river and its affluents afford, will go equally far in reconciling all sectional differences and in restoring the country to its former relations as a unit in patriotic sentiment and mutual interests.

Resolved, That entertaining these views, the Saint Louis Board of Trade earnestly and respectfully ask of the national legislature such action as will secure the early completion of the work.

Witness the signature of the secretary of said board, and the seal thereof, affixed the day and year first above written.

WM. B. BAKER.

Secretary.

[SEAL.]

Hon. SPEAKER

House of Representatives, Washington City.

SUPERINTENDENT OF INDIAN AFFAIRS FOR COLORADO.

MARCH 2, 1867.—Laid on the table and ordered to be printed.

Mr. HART, from the Committee on Indian Affairs, submitted the following evidence:

WASHINGTON, D. C., *February* 19, 1867.

CHARLES A. MIX, sworn and examined.

By the CHAIRMAN:

Q. What is the paper here presented?

A. This paper purports to be an abstract of the expenses of A. Cumming, for the quarter ending September 30.

Q. I want to call your attention to voucher No. 25, in that list, purporting to be the payment of \$450 to M. B. Cumming, for services as clerk. Do you know who M. B. Cumming is?

A. I do not. I know no further than what the paper says.

Q. Do you know that handwriting?

A. It is the first time I have observed it.

Q. Then you don't know whose handwriting it is?

A. I know nothing more of the voucher than what it purports to be.

(Mr. Bradford, delegate from the Territory of Colorado, was permitted to examine the witnesses.)

By Mr. BRADFORD:

Q. I call your attention to voucher No. 1. Do you know anything about that transaction?

A. It purports to be a voucher for payment to E. H. Kellogg, on August 17, 1866, for 100 sacks of flour, at twelve dollars per sack.

Q. Look at voucher No. 2.

A. It purports to be for thirty-four head of large American beef cattle sold to the superintendent of Indian affairs and delivered to him for treaty purposes at Middle Park, at eighty dollars per head; carried out \$2,720.

Q. The next voucher I wish to call your attention to is No. 19.

A. No. 19 is an account against the United States, of Manuel Lusero, of having sold, on the 22d of September, 1866, thirty-seven head of beef cattle, at \$55 per head, furnished the Colorado superintendent of Indian affairs, amount, \$2,035.

Q. Look at the next, No. 20.

A. Voucher No. 20 is that of M. V. Stevens for 100 head of sheep, at \$3 50 per head, furnished Colorado superintendent of Indian affairs, \$350; and eleven head of large American beef cattle, at \$70 a head, furnished Colorado superintendent of Indian affairs, \$770—total, \$1,120.

Q. Look at No. 31. I would like to call your attention to it.

A. Voucher No. 31 is a voucher from G. A. McClure for rent of office from July 1, 1866, to September 1, 1866, occupied by superintendent of Indian affairs for three months, \$150.

Q. Look at voucher 28. What is it?

A. Voucher No. 28 is for the care of two horses and buggy belonging to Colorado superintendent of Indian affairs, at \$100 per month, from July 31 to September 31, inclusive, \$300.

Q. What is voucher No. 37?

A. Voucher 37 is from L. Mulling, September 30, 1866, for freight of 9,700 pounds of goods for the Tabeguache Ute Indians, from Denver to camp on the Rio Grande river, 250 miles—across the snowy range—at 12 cents per pound, \$1,764. Four wagon sheets taken by Indians and not returned, \$12 24.

(Witness took up another sheet of paper.)

By the CHAIRMAN:

Q. What is that paper you now have in your hand?

A. This paper purports to be an abstract of the disbursements of A. Cumming, superintendent of Indian affairs, for the quarter ending June 30, 1866, for current expenses.

By Mr. BRADFORD :

Q. What is voucher No. 1 for ?

A. It purports to be an account of A. C. Hunt for one American stallion, \$285, furnished the Colorado superintendent of Indian affairs. The explanation at the bottom of the voucher by the superintendent is, "for the use of the Indians under treaty stipulations."

Q. Look at voucher No. 4.

A. Voucher No. 4 is from G. W. McClure for rent of office, and occupied by Colorado superintendent of Indian affairs, to June 30, 1865, at \$70 per month, \$350.

Q. Look at voucher No. 7.

A. Voucher No. 7 is from Frank Fay for the care of and keeping one American stallion bought for the Coneyo Indians, \$70. Mr. Cumming writes, March 27, 1866: It is not practicable for me to furnish special vouchers for my expenses, as when I came out here I brought my family with me, and the amount is not estimated for individuals. The amount is about \$250.

Q. That is his expense going out there ?

A. I presume so.

By Mr. ROSS :

Q. Has any of this account been settled ?

A. My impression is, his account up the 30th June has gone up to the Auditor's office. I will not speak positive about it.

By Mr. BRADFORD :

Q. Look at No. 9, and tell what it is.

A. It is from M. B. Cumming, for services as clerk of Colorado superintendency of Indian affairs for six months, at \$150 per month, \$900.

Q. Read the receipt.

A. Received, at Denver, June 30, 1866, of A. Cumming, governor and *ex officio* superintendent of Indian affairs, \$900, in full payment of the above account.

M. B. CUMMING.

I certify, on honor, that the above account is correct and just, and I have actually, this 30th day of June, 1866, paid the amount thereof.

A. CUMMING.

(Witness took up another paper.)

By the CHAIRMAN :

Q. What does that paper purport to be ?

A. This paper is entitled "Disbursements of Alexander Cumming, governor and *ex officio* superintendent, for the quarter ending December 31, 1866."

By Mr. BRADFORD :

Q. Look at voucher No. 4 therein.

A. It is from A. Wanlich, for the freight of 19,600 pounds of goods for the Grand River and Uintah Indians, from Denver to Middle Park, at 12 cents per pound, 150 to 160 miles, across the Snowy range of the Rocky mountains, \$2,352.

Q. Look at No. 5.

A. No. 5 is from A. C. Hunt, October 1, 1866, "for services rendered as commissioner to assist in the business of the treaty with Grand River and Uintah Indians, under appointment of the Colorado superintendent of Indian affairs, and by authority of a letter from Mr. Ccoley, from June 1 to August 1, 1866, 30 days, at \$5 per day, \$150; tax deducted, \$5 12; leaving \$144 88. Expenses of horse ridden to the treaty ground, while there, and return to Denver, 20 days, at \$5 per day, \$100. I certify that the above account, as exhibited by me, barely covered my actual expenses. It is not sufficient compensation for loss of time and leaving my business while engaged in the Indian service."

Q. Look at voucher No. 21.

A. "The United States to Lewis Thomson, Dr., for rent of office occupied by Colorado superintendent of Indian affairs, for two months, from November 1 to December 31, at \$50 per month, \$100."

Q. What is voucher No. 22 ?

A. "United States to M. B. Cumming, for services as clerk for three months, at \$150 per month, \$450; tax off, \$15."

Q. Look at voucher No. 23, and state what it is for ?

A. Voucher No. 23 is from J. Wilson, for services as messenger in the office of the superintendent of Indian affairs, Colorado, for making fires, &c., for six months, at \$41 50 per month, \$249. Dated July 31, 1866.

Q. Look at voucher 27.

A. Mr. A. Boyd Cumming's services as secretary to commissioners at treaty in Middle Park with the Grand River and Uintah Indians, twenty-seven days, at \$5 per day, \$135. Use of the horse, *en route* for same duty and in returning, same period, twenty-seven days, at \$5 per day, \$135. Expenses \$70 returning. Aggregate, \$340.

Q. Do the records of your office show when M. B. Cumming was appointed clerk of the superintendency?

A. I cannot say at what date the appointment was confirmed, but the employment commenced on January 1, 1866.

Q. Was the appointment approved by the department?

A. Yes.

Q. Does it show whether the person was a man or a woman?

A. No; it just gives the name, M. B. Cumming.

E. M. ASHLEY sworn and examined.

By the CHAIRMAN:

Q. I hand you voucher No. 22, signed by M. B. Cumming; state if you know the handwriting?

A. The body of the voucher is written by Mr. Thomson, I think. I don't know the writing in the receipt.

By Mr. BRADFORD:

Q. Where were you for the last year?

A. In Denver City.

Q. Did Governor Cumming keep his office there?

A. Part of the year.

Q. State what part of the year.

A. I don't remember the time. He moved to Golden City some time during the year 1866.

Q. What business were you in there?

A. I was chief clerk in the surveyor general's office.

Q. Do you know of any such person as M. B. Cumming being employed as clerk to the superintendent?

A. I do not.

Q. Do you know who this person is?

A. I know one Miss Mary B. Cumming, the daughter of Governor Alexander Cumming.

Q. How long did she reside in Colorado, or when was she last there?

A. It is my opinion she left there May 2, 1866, but I am certain it was during May.

Q. Has she been there since she left at that time?

A. No.

Q. During the time she resided there are you aware that she performed any service in that office?

A. I am not.

By Mr. ROSS:

Q. Was the office separate from the house or connected with it?

A. It was separate from it.

Q. Where is McClure's building?

A. It is on Laramie street between F and G, on what is called McClure's block.

By the CHAIRMAN:

Q. Did you ever hear of any other M. B. Cumming except Miss Mary B. Cumming, the governor's daughter?

A. No.

By Mr. ROSS:

Q. What is the customary salary of a good clerk per month?

A. A first-class clerk gets \$150 per month. Clerks generally get from \$100 to \$150 per month.

By Mr. HART:

Q. How large a place is it?

A. It contains about five thousand people.

Q. Are you well acquainted there?

A. I am acquainted there tolerably well; I have lived there five years.

By the CHAIRMAN:

Q. I wish to call your attention to voucher No. 9. Is that in the same handwriting as the others, in your judgment?

A. Yes; the body of it is.

Q. The signature of the receipt seems to be by the same person?

A. Yes; but not the certificate.

Q. This is dated at Denver, June 30. Was this young lady there at the time?

A. No.

Q. Is the body of voucher No. 25 in the same handwriting as the body of the last?

A. It is.

Q. Is the signature to the receipt in the same handwriting as the signature to the last receipt?

A. Yes.

Q. Was Mary B. Cumming there at that time?

A. She was not there then.

By Mr. BRADFORD:

Q. Do you know the handwriting in voucher No. 4?

A. The body of the voucher is in Major Thompson's handwriting; the same of the body of those others.

Q. Do you know the signature, John Wanlich?

A. I do not know his signature; I know himself well enough.

Q. What is the actual distance from Denver to Middle Park for freight purposes?

A. About from seventy-five to eighty miles—not over eighty miles.

By the CHAIRMAN:

Q. The voucher states it to be from one hundred and fifty to one hundred and sixty miles: how are the roads between these points, good or bad?

A. In parts of the range they are quite bad—half the distance very bad roads at the time the voucher was given.

Q. Was it so bad that a reasonable load could not be hauled over it?

A. I was not over it since 1862.

Q. You don't know how it is since?

A. No.

Q. What distance was very bad?

A. About fifteen miles.

Q. How was the balance of the road?

A. Very good.

Q. What would be a fair price for transportation per one hundred pounds at the time the voucher was given over the road?

A. I should think five or six cents a pound would be a fair price.

Q. You mean as the roads were when you were over them?

A. I presume goods would be taken over it for that price.

Q. That is, they could have been at the time you were there?

A. Yes.

Q. In voucher No. 27, who wrote the body of it?

A. The same person that wrote the rest, Mr. Thompson.

Q. It purports to be for A. Boyd Cumming; who is he?

A. A boy about fourteen or fifteen years old. I have seen him frequently; he is a brother of this young lady.

Q. Do you know whether he performed any services as secretary to that council?

A. No.

Q. Do you know the handwriting in No. 21?

A. I cannot say whose it is. I do not know the signature. I have never seen Thompson's signature but once or twice.

Q. You think the body is in the same handwriting as the others?

A. I think it is, but it has been written with a very bad pen.

Q. Do you think the signature is in the same handwriting?

A. I could not say anything really about that voucher.

By Mr. Ross:

Q. Who is Major Thompson?

A. He is clerk to Governor Cumming, and does all the writing in the office.

JOHN EVANS sworn and examined.

By the CHAIRMAN:

Q. Can you tell the distance from Denver to Middle Park, to Hot Sulphur Springs?

A. It is generally understood to be about seventy-five or eighty miles.

Q. What is the character of the road?

A. The road to Empire City and for six or eight miles above that is understood to be a very good road. I have travelled over it a number of times, and from there over the range, which is said to be pretty rough, though recently there has been a good road built. I think in the spring of 1866 it was announced in the newspapers that Mr. Jones had built a good wagon road across the range.

Q. Was it in December, 1866, that announcement was made?

A. I cannot exactly say. I only saw it announced in the papers.

Q. When was that announced?

A. In the spring or summer of 1866, I think.

Q. What would you consider a fair price for hauling freight over that road, per 100 pounds?

A. I am not conversant with the prices; they vary very much, as sometimes you can get it a great deal cheaper than at other times, owing to the price of subsistence and the number of teams.

Q. What would be the variation between the prices?

A. From any given price to double the price.

Q. What price would you think a fair one for goods over that road?

A. If the road was good for that distance, the price ought to be about four or five cents a pound. I do not pretend to say, exactly, because I have not been down there this spring.

By Mr. Ross:

Q. If the road was bad what would be a fair price?

A. If the road was passable for wagons, and they were hauled by wagons, I think the price stated by Mr. Ashley, in his evidence, a reasonable price. August is the best season to transport goods across the range. I think Mr. Ashley's estimate a fair one, and as high as we ought to pay.

By the CHAIRMAN:

Q. If the roads are completed and good, as stated, would not that be a high price?

A. I should think it to be a fair price.

By Mr. Ross:

Q. Was it customary for the superintendent of that region to have an allowance for office rent and clerk-hire; and if so, at what rate?

A. The clerk-hire is regulated by the department here. They authorize the amount of clerk-hire you are to have, or at least they did when I was in office, and they also appointed the clerk and fixed his salary. After I had been two years endeavoring to do so, I got them to allow me a clerk. At that time clerk-hire was very high, and I could not get a good man for less than \$1,800 a year. and then I got Mr. Cheever as clerk, and his appointment was approved of in Washington and he was allowed \$1,800 a year.

Q. Were you allowed office rent; and if so, how much?

A. I was allowed what I had to pay.

Q. State the amount.

A. While I was there I divided the rent between the executive and the Indian department; I think about half each.

Q. At what rate?

A. I paid \$100 a year, and I had an office in common with the secretary; he paid \$250 a year because he had two rooms. The gross amount was \$350 a year for mine and the secretary's.

Q. Do you know this room that was occupied by Mr. Cumming?

A. I have been in the room, simply, and do not know how much of it was occupied by the Indian Office.

WASHINGTON, Thursday, February 21.

WILLIAM GILPIN sworn and examined.

By Mr. BRADFORD:

Q. Where do you reside?

A. At Denver City, Colorado.

Q. How long have you resided there?

A. Permanently, since 1861.

Q. What is the distance from Denver to the Hot Springs?

A. It is in the neighborhood of eighty miles.

Q. What would you consider a fair price per pound for hauling freight from Denver to near Hot Springs, last August?

A. There are no established rates there; but, judging from the fares charged on the central lines of transportation, I should say that from three to four dollars per 100 pounds would be a fair compensation.

By the CHAIRMAN:

Q. In passing from Denver to the Hot Springs would you cross what is called the "snowy range" of the Rocky mountains?

A. Yes. I call it the cordillera.

Q. How were the roads there in August, 1866?

A. The roads are difficult over the sierra.

By Mr. BRADFORD:

Q. What would you consider a fair price for hauling from Denver to the Rio Grande beyond Fort Garland?

A. I should think \$4 a hundred.

Q. Do you know of any person about the executive office in Colorado, or living in the Territory, named M. B. Cumming?

A. I do not.

A. C. HUNT sworn and examined.

By Mr. BRADFORD:

Q. Where do you reside?

A. In Denver City, Colorado. I have resided there for eight years.

Q. How many rooms have been occupied for the executive and Indian offices there?

A. Governor Evans had three rooms in the building occupied as the executive quarters on the west side of Cherry creek, and had his private office at his own house most of the time. In McClure's building there were two very large rooms and one small one, occupied both as an executive and Indian office, besides the library room up stairs.

Q. Was the office of the secretary of the Territory also there?

A. Only for a short time. He removed on account of a difficulty between him and the governor.

(A voucher for the salary of M. B. Cumming was here handed to the witness.)

Q. Do you know the signature of M. B. Cumming to that voucher?

A. I do not. I take it for granted it was it was intended for the governor's daughter. I have seen her writing quite often, but am not very expert in judging of handwriting. Her name is Mary.

Q. Do you know whether she acted as clerk of the superintendency?

A. I do not know. She left the Territory some time last spring. The governor had a son there, who did a good deal of writing, but they called him Alexander. There was also a gentleman there named Cheesman, who was always writing, and Major Thompson, and different other parties; I do not know in what capacity they were employed.

(To the chairman:)

I do not know any M. B. Cumming who was in the Territory, unless it was Mary Cumming. There are other Cummings there, but they generally spell their names differently. Mary Cumming went to the Territory in September or October, 1865. I was in the office almost every day that I was in Denver, and often three or four times a day, my store being directly under the office. If there had been any person named Cumming there, except the governor and his son and daughter, I should have known it.

(Voucher No. 2, in the name of James Wilson, for keeping a team of horses for the superintendent was here shown to the witness.)

By Mr. BRADFORD:

Q. Do you know James Wilson?

A. There are a number of Wilsons there, but I do not know any person of that name as keeping the superintendent's team.

Q. This appears to be a voucher for \$125 for keeping two horses one month; is that a fair price?

A. I suppose that a livery stable would charge that. It often costs more in the Territory to board a horse than it does to board a man. It would cost very much less to keep horses in the country, because they would run on the grass; but that is not usually a good plan for American horses. Some seasons there would not be any grass there in April on which a horse could live; but some seasons there is good grass even in March.

(Voucher No. 47, in the name of Frank Fay, for keeping a stud-horse was here shown to the witness.)

Q. Do you know any such person as Frank Fay?

A. There is a trader named Fay, who is in Denver a good deal. I do not know of his keeping the stud-horse. I know there was such a horse.

(Voucher No. 2, in the name of H. B. Bennett, for cattle, was shown to the witness.)

Q. Do you know anything about this?

A. I know the signature to be that of H. B. Bennett. And I know that the cattle were furnished to the Indians at Middle Park. I was a commissioner for making that treaty; and that is how I know that the cattle were delivered.

(Voucher No. 20 being handed to the witness.)

I know this signature of M. V. Stevens, and I know the cattle were delivered. A part of them belonged to his father; and the money was sent through me to his father. (Voucher No. 19 being handed to witness.) These cattle were furnished by Manuel Lusero. They were bought from different parties to be used for treaty purposes. Part of them were taken down with a team of mine. I think the price charged for the cattle is a fair price. (Voucher No. 37 being handed to the witness.) This is evidently the signature of L. Mullen. I know he performed these services. The teams he used were mules.

By the CHAIRMAN:

Q. What is the distance from Denver to the camp on the Rio Grande river, across the Snowy range?

A. About 210 miles would be the extreme distance, unless the teamsters went by the lower ford of the Rio Grande, as I heard some of them say they did, which would lengthen the distance ten or twelve miles.

Q. The furthest route they could take would be within 250 miles?

A. Yes, sir; that would be the furthest. A part of the way it is an excellent road, but a part of the way it is very difficult. It is a bad road one-third of the way.

(Voucher No. 27, fourth quarter of 1866, being shown to witness.)

I think this A. Boyd Cumming is the son of Governor Cumming. They always call him Alexander. He acted as secretary at that treaty, and so did Lewis Thompson. The governor kept the notes himself. The rough draught of the treaty was drawn by the governor. The son is about seventeen or eighteen years of age. There was no other A. Boyd Cumming acting there unless it was the governor's son. I should think they were gone twelve or fifteen days.

(Voucher No. 23, in the name of James Wilson, for services as messenger, being shown to witness.)

This may be the guide who accompanied the governor, or it may be his colored man Jim. He had two colored men—Thomas and James—and one went on the trip. There was also an Irishman in the office who was called James.

(Voucher No. 4, in the name of John Wanlace, being shown to the witness.)

I know this signature. I know that Mr. Wanlace performed the services charged for. Part of the teams were mine, and part were obtained from different parties. Part of the beef cattle were used to haul freight. That was necessary on account of the difficulty of the road.

WASHINGTON, D. C., February 26, 1867.

A. C. HUNT recalled and examined.

By Mr. BRADFORD:

Q. In transporting the freight to Middle Park, you said the other day, portion of these beef cattle were yoked up?

A. Some of them were.

Q. What portion of them?

A. I cannot tell, as I was not with the train at the time. They were yoked up until they got to the summit of the mountain, and then they were driven down.

Q. How many teams were there of these beef cattle?

A. There were nine wagons, or may-be ten in all.

Q. I asked how many were there of these beef cattle?

A. It is impossible for me to tell.

Q. How many teams were furnished by Captain Wanlace?

A. I cannot tell. We picked them up from different persons, and each person who had anything in it drew the same pay as the rest.

Q. How many did he furnish?

A. I cannot tell.

Q. There were two mule teams; were there any other ox teams except the beef cattle?

A. Yes; we had some to bring the wagons back. Mr. Oakes was with the teams the whole time.

Q. Do you know that Captain Wanlace furnished any?

A. I know he furnished a portion.

Q. Did you furnish any yourself? and if so, how many?

A. I cannot tell, because we picked them up from different persons.

Q. Was Captain Wanlace along himself?

A. No.

Q. He was not there at all?

A. No.

Q. He was not assisting in transferring this freight?

A. No.

Q. Do you know that he had a contract for hauling this freight?

A. Yes.

Q. Do you know whether he received this money?

A. I do.

Q. You were one of the commissioners who formed this treaty?

A. I was.

Q. I understand you to say this young man, A. Boyd Cumming, did not act as secretary at all?

A. I do not know that he acted as secretary. He was doing the writing. He was seated by his father.

Q. You do not know that he acted as secretary?

A. I do not know what you call secretary; but I know he did some writing. I did not know I had any authority to employ a secretary.

Q. Did not the Hon. H. P. Bennett make application to act as secretary, and was refused on the ground of expense?

A. Mr. Oakes spoke to me about himself; but I did not know that Mr. Bennett offered to do so.

Q. You know nothing of A. B. Cumming serving as secretary on your commission?

A. I know nothing about it.

By the CHAIRMAN:

Q. You say each person who had anything in it drew the same pay as the rest. What do you mean by that?

A. In making out vouchers of that kind, in order to save the trouble of having a number of papers where there are four or five partners in putting the teams together, the voucher is put in the name of one person.

Q. And then this amount is divided into equal portions for each?

A. Yes.

By Mr. BRADFORD:

Q. Does this 19,600 pounds of freight include all that was hauled by the beef cattle?

A. I think it includes all the freight taken over. I suppose the voucher corresponds with the amount of freight taken over.

WM. GILPIN sworn and examined.

By A. CUMMING:

Q. Were you ever to the Berthoud Pass?

A. I have been on the Pass?

Q. How far is it from Sulphur Springs to Denver?

A. Seventy-five to eighty miles.

Q. Did you ever go across the Boulder Pass?

A. No.

Q. Did you ever forward any goods into Middle Park?

A. Never.

Q. Nor go up with any forwarded there?

A. No.

(A map was here presented to witness.)

Q. What route would you take to get goods into Middle Park?

A. From Denver to Clear creek the road ascends, and thence I would go along to Empire, and in that line to Berthoud Pass, then to the north and through.

Q. I understand you to say the distance is eighty miles. Have you been up that road?

A. Yes.

CHARLES A. MIX recalled and examined.

By Mr. CUMMING:

Q. Be good enough to state to the committee if there has been from any superintendency on the continent as little complaint and trouble with the Indians since my administration as there has been from the Colorado superintendency.

A. My opinion is that since the Cheyennes and Arrapahoes were taken away from the Colorado superintendency and placed in the Central, there has been as little complaint as regards the disposition of the Indians to make war from Colorado as from any other superintendency.

Q. Tell the chairman whether there ever has been less complaint from that superintendency than during the eighteen months of my administration; I mean complaints about troubles with the Indians.

A. I think that, so far as these complaints go, there has heretofore been, in the early part of the administration, no complaints, except with the Indians west of the Snowy range. There were some little complaints before this treaty was made of an anticipated outbreak, which amounted to nothing.

Q. Complaints since my administration?

A. Last summer from the Tabequaches.

Q. That was from the New Mexico Indians who came into our Territory?

A. I supposed they belonged to that place, as it was stated the trouble was there. They did not.

WM. R. BREWSTER sworn and examined.

By Mr. CUMMING :

Q. Were you ever in Middle Park ?

A. I was there last summer.

Q. How did you get there ?

A. I went over the Berthoud Pass.

Q. How did you get out ?

A. By what is now called the Jones road, which he was building then, but is now completed.

Q. Was there any road there when you were there ?

A. There was no road there at the time.

Q. Or sign of a road ?

A. No.

Q. Would it have been possible to have taken wagons across that road ?

A. I think not.

Q. What has been your business in Colorado for the last year or two ?

A. I had the management of the Overland Despatch Company's business.

Q. Are you familiar with freighting, &c. ?

A. I am.

By the CHAIRMAN :

Q. What, in your estimate, would be a fair price, per 100 pounds, for freighting from Denver to Sulphur Springs in August ?

A. I would not like to have taken the contract at all, because I had not been over the roads which go into the Park, and it would be hard for me to say what it would be worth.

Q. You did not want to take it at all ?

A. I did not, because I understood the time this train was going into the Pass there would be great delays.

Q. You cannot fix on any value, then ?

A. I would not like to do so.

J. H. LEAVENWORTH sworn and examined.

By Mr. CUMMING :

Q. Were you ever in Middle Park ?

A. I was.

Q. How did you go there ?

A. From Centre City across by the head of Mill creek.

Q. Did you ever hear of anybody taking freight on wheels across the Berthoud Pass ?

A. Not at the time I was there.

Q. Would you like to undertake to freight goods across to Middle Park by the Pass ?

A. Not at the time I went through in 1861. When I crossed there I would not like to undertake to transport goods by wheel.

Q. Do you know that there is any material change in the mode of going into the Middle Park since that time ?

A. I do not.

Q. What is the comparison between the transportation across this mountain and ordinary transportation across the country ? Is there much difference between the two ?

A. I should think so.

By the CHAIRMAN :

Q. Can you give any estimate of what freight would be worth ?

A. I don't think I could give any estimate ?

A. C. HUNT recalled and examined.

By M. CUMMING :

Q. State to the committee what interest I had in this transportation.

A. You had none.

Q. Will you be good enough to say whether, of your own knowledge, I paid these bills as audited to me by Agent Oakes, in whose charge this business was, and sanctioned by you in every case ?

A. You did. Perhaps it will be well to say that the freight was engaged and the teams got together and started before you got to the Territory ; it was done on the order of the Indian Commissioner by telegraph, and we went to work at once, as we had only the smallest possible space of time to get it off in.

Q. Do you know whether anybody has ever dreamed of taking wheels across the Berthoud Pass ?

A. I know there never were wheels went across it.

Q. Don't you know it is impossible to take them across there ?

A. Yes.

By the CHAIRMAN:

Q. Was that the road by which these goods did go?

A. No.

By Mr. CUMMING:

Q. How did they go?

A. By the South Boulder Pass, as far as they could, then mounted the top of the mountain and along the Snowy peak. We were three days going one mile with two men to every wagon, and the men were paid \$50 per month and their board.

By the CHAIRMAN:

Q. How many men did you say?

A. Two drivers to each wagon, and, in addition, twelve men to help us.

Q. Was there any better road than the one you took?

A. No. I told the agent that it was a mad thing to go there.

By Mr. CUMMING:

Q. How did you get them down over this worst part of the road?

A. We broke down four wagons.

Q. Did you know these Indians had about two thousand ponies?

A. Yes; I think they had.

Q. Don't you know that, to extricate this freight from the dilemma in which it was, Agent Oakes went and told the Indians that the liberality of the government was so great that the wagons had broken down, and that they should come up and get them over?

A. Yes; and they did come, and we killed three beeves for them, and they eat them.

Q. Do you not know that the whole proceedings were suggested to the Indian department by the agent in charge of the business of these Indians, and that upon his suggestion the order was made to hold this counsel?

A. I know that.

Mr. CUMMING to the chairman; There is an estimate, which I put in evidence.

The following was then read:

15,000 pounds flour at twenty cents, Denver price ..	\$3,000 00
1,500 pounds sugar at forty-five cents ..	675 00
300 pounds coffee at fifty cents ..	150 00
500 pounds tobacco at one dollar and twenty-five cents ..	625 00
40 head of beef cattle, probable cost \$80 ..	3,200 00
Probable cost of transportation at twelve cents per pound ..	2,076 00
Total ..	<u>9,726 00</u>

WITNESS. The agent said I made that estimate too low.

Q. Was not this flour estimated at twenty cents?

A. Yes.

By Mr. BRADFORD:

Q. Who made that contract with Colonel Wanlace?

A. There was no contract made with any person. There was an agreement made with all who put in their teams that they should draw in proportion to the estimate made by Mr. Oakes and myself. The voucher was made out in one person's name, as it seemed to be the best way to put them in one voucher. It was not a regular contract.

Q. You had no regular contract made, then?

A. Only a verbal one.

Q. You say he only furnished two teams?

A. Captain Mullen only furnished two teams. Colonel Wanlace, Laggendorf, and myself had some cattle, and we put in what we had and divided what we got; but we were limited by this estimate.

Q. I understand you to say Colonel Wanlace drew this money?

A. His proportion of it.

Q. He did not draw all of it?

A. He drew it from the governor, and each one got his proportion.

Q. Do you mean the beef cattle?

A. The beef cattle were put in to help do the hauling. At starting it was not supposed they would be wanted, as we had eight cattle besides, but we found we were behind the time that had been appointed to meet the Indians, and we were anxious to get on.

Q. There was, then, no contract made with Colonel Wanlace?

A. No contract; it was understood that the price would be limited to the estimate.

Q. He was not present himself?

A. No, he did not go himself.

Q. Did he do anything at all?

A. He did.

Q. What did he do?

A. He helped to get together the teams.

Q. Was there a contract made for this transportation done to the Rio Grande—for the voucher signed by Captain Mullen?

A. I told Captain Mullen I would give him twelve cents per pound.

Q. Who owned the teams that did that transportation?

A. He did.

Q. Did he own them all?

A. I do not know whether he, or his son or his brother owned any.

Q. Did you own any of them?

A. I owned one ox team that went down the early part of the summer.

Q. Who owned the wagons?

A. He owned them.

By Mr. CUMMING:

Q. Was it necessary or usual for persons undertaking to carry freight to always accompany their teams?

A. Very rarely. I seldom go with them.

Q. When Agent Oakes presented these vouchers, were they not examined with care to see that they were right?

A. I know they were, because Oakes and I were present at the time.

Q. Were not the goods sent to the Rio Grande forwarded before I arrived in Denver?

A. Oakes sent one load.

WASHINGTON, February 27, 1867.

JOHN EVANS recalled and examined.

By Mr. CUMMING:

Q. In stating the distance to Sulphur springs, you meant by way of Empire City?

A. Yes, sir.

Q. You were never in the Middle Park at all?

A. I have been in the arm of it, by the Blue river.

Q. Is that on the route to Sulphur springs?

A. No, sir. I suppose you could go around that way, but it would be a long way out of the way.

Q. How much out of the way?

A. Some forty or fifty miles.

Q. How long were you governor of Colorado?

A. About four years.

Q. What is regarded as the ground of the Uintas and Wanta band of Indians?

A. The country that they claim as their country is described in the report of their agent, Major Whitely, which was forwarded to the Indian Bureau in 1864; the exact boundaries of it I cannot recollect.

Q. What do you regard as the eastern boundary of their grounds?

A. What is called Gore's Pass, lying west of the Middle Park.

Q. Have you ever sent any goods to that region of the country?

A. No, sir.

Q. Do you know anybody who sent any goods to their ground, or what was regarded as their ground?

A. The agency for them was established by Major Whitely in Middle Park when he first went there, and I believe goods were sent there by him.

Q. Do you know how he took the goods there?

A. I think he took them by pack trains; in fact, communication was almost entirely by pack trains at that period.

Q. Don't you know there was no road through the Middle Pass last August?

A. I do not. I understood from the public prints that Mr. Jones had made a road over the range, by the Pass.

Q. Did you see Mr. Jones?

A. I saw a notice last summer that he had opened such a road.

Q. Did you ever see anybody who had gone to the Middle Park by that road?

A. No, sir; I have not been in a position to have seen anybody.

Q. You kept a pair of horses during your superintendency.

A. Yes, sir; part of the time.

Q. What was the probable cost of keeping them at the time you retired from office?

A. It was very high. We had to pay eighteen to twenty cents per pound for corn.

Q. Do you know that signature? (A voucher shown to witness signed by Thomas Goodrich.)

A. Yes, sir.

Q. Was that man in your employ?

A. Yes, sir. He was employed by the government to take care of the horses.

Q. Was he not in your private employ also?

A. He was a part of the time.

Q. You consider this a fair charge do you not?

A. Yes, sir.

Q. You did not consider it wrong for him to make this charge while he was in your private employ?

A. I did not think it inconsistent at all for him to take care of my rooms while employed by the government. I kept my office in my house up to this time.

Q. Don't you know that it was impossible to send wagons by the Boulder Pass?

A. No, sir. I know that goods were sent by that Pass. At the time Major Whitely was there he had a detachment of troops with him, and the government teams went over to the Hot Sulphur springs, crossed the Boulder Pass to his camp, and his goods may have gone that way for all I know.

Q. The distance you mentioned was over the route travelled by Major Whitely?

A. Yes, sir. Major Whitely went by trail. There was no wagon route then.

Q. You never travelled over that route?

A. I never travelled to Sulphur springs.

Q. Don't you remember whether you sent goods to the Indians?

A. If goods were taken there they were taken by Major Whitely, and not by me. I never took any personally.

Q. Never ordered any?

A. I do not remember whether I ordered the goods that Whitely took or not.

W. R. BREWSTER recalled and examined.

By Mr. CUMMING:

Q. Do you know Mr. Esterbrook, a livery stable keeper?

A. Yes, sir.

Q. Do you know him to be a respectable man?

A. Yes, sir.

Q. Would you recognize his signature?

A. I am not certain. I have paid several bills of his. I think I would.

Q. Is that his signature? (A voucher was here shown to witness.)

A. I could not say, but my impression is that it is.

Q. Do you consider that a fair charge when you were there?

A. I should think it was. I know I was paying for a large number of horses there, and it cost me very nearly \$1 50 a day for them.

Q. When did you reside in Denver?

A. I was there in December, 1865. I went there again in April, 1866, and remained there until May, when I went to New Mexico, and returned in July and remained until November.

By Mr. BRADFORD:

Q. Do you know Alexander D. Cumming?

A. Yes, sir.

Q. How old is he?

A. About fifteen or sixteen years old.

Q. Did he accompany you out there?

A. Yes, sir.

Q. Did he perform any service?

A. Not while he was with us. I allude to when we went out there, and not when we returned.

A. A. BRADFORD sworn and examined.

By Mr. CUMMINGS:

Q. You handed the chairman some affidavits the other day.

A. Yes, sir.

Q. When did you receive those affidavits?

A. About three or four days ago.

Q. From whom?

A. They were accompanied by a letter from J. Q. Charles.

Q. Have you got that letter?

A. I may have it in my room.

Q. Will you send it to the committee?

A. If I can find it I will.

Q. Were any other affidavits sent to you?

A. Yes, sir; a few more. There was one from Mr. Whitsell.

Q. Have you any affidavits upon some other subject?

A. I don't think I have.

A. O. PATTERSON sworn and examined.

By Mr. BRADFORD:

Q. Where do you reside?

A. Golden City, Colorado Territory.

Q. How long have you resided there?

A. About a year. I have lived in the Territory about seven years.

Q. Were you present at or about the time a treaty was made at Middle Park?

A. I was not present; I was in the vicinity.

Q. Were you on the treaty ground after it was made?

A. I was very near it.

Q. How far is Denver from Sulphur springs by Boulder Pass?

A. I think it is about a hundred miles.

Q. How far from the springs was the treaty ground?

A. I could not say; I was not there.

Q. How far do you suppose it was?

A. It was the general impression that it was at the springs.

Q. Did you see the party the next day?

A. I saw Governor Cumming.

Q. The route by the Boulder Pass was the only one used?

A. I believe so. I have learned that a route has since been made by Mr. Jones.

Q. You are frequently at Denver?

A. Yes, sir.

Q. Are you frequently at the Indian office there?

A. I frequently called there.

Q. Do you know of any clerk sitting there during the year 1866?

A. I cannot recollect of any now. There is a clerk—I cannot recall his name now—that came down with Governor Cumming.

By Mr. CUMMING:

Q. You did not, in fact, know anything about the arrangements of my office?

A. No, sir.

Q. Don't know who did the work?

A. No, sir.

Q. Was there any possibility at the time you were there of going through Bethoud Pass with a wagon?

A. No, sir; none at all.

Q. Do you know anything about Mr. Jones attempting to go through the Middle Park?

A. I do, something about it.

Q. Do you know what success he had?

A. He could not get through with his teams, and went around by Breckinridge.

Q. Do you know his expedition was an entire failure?

A. He told me it was not.

GEORGE A. CHILLICOTT sworn and examined.

By Mr. BRADFORD:

Q. Where do you reside?

A. Denver, Colorado.

Q. What business were you in there?

A. I was register of the land office.

Q. Have you been frequently at Fort Denver?

A. Yes, sir.

Q. What would be a fair price for hauling freight to the crossing of the Rio Grande from Denver, by way of San Christo?

A. I should say five cents would be very liberal.

Mr. Cumming asked permission to offer in evidence the following papers:

[Telegram.]

PHILADELPHIA, June 27, 1866.

A. C. HUNT, *Denver, Colorado*:

I am authorized by the Commissioner to appoint a council for treaty with Agent Oakes's Indians, in Middle Park, August twelfth, (12,) and at Conejos, for Agent Head's bands, for annual distribution of goods, August thirtieth, (30.) Please request both to make arrangements promptly. Limit Oakes's purchases to five thousand (5,000) dollars, and Head's according to original estimate. Assemble as many Indians as possible. Letter by mail.

A. CUMMING,
Governor and Sup't Indian Affairs, Colorado Territory.

PHILADELPHIA, July 6, 1866.

SIR: I have the honor to enclose a copy of a telegram which I sent in accordance with your instructions to the agents in the Colorado superintendency.

I deemed it wise to send the despatch to Mr. A. C. Hunt, a prominent citizen of Denver, because of the distance of the Conejos agency (L. Head's) from the terminus of the telegraph, and also on account of my uncertainty as to Agent D. C. Oakes's whereabouts at the time. Mr. Hunt will see that both the agents are furnished with copies for their guidance.

I am, very respectfully, your obedient servant,

ALEXANDER CUMMING,
Governor and ex officio Sup't Indian Affairs, Colorado Territory.

Hon. D. N. COOLEY,
Commissioner of Indian Affairs.

[Telegram.]

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A. CUMMING,
Governor and Superintendent Indian Affairs, Colorado Territory.

DENVER, COLORADO, July 25, 1866.

WASHINGTON, July 25, 1866.

Hon. D. N. COOLEY, *Commissioner of Indian Affairs*:

Has a treaty with the Indians been ordered? If so, what measures am I to take in the premises? I want instructions. Can hear nothing from Governor Cumming. Immediate and definite action is necessary to prevent a general war with these tribes.

FRANK HALL,
Acting for Col. Terry, and ex officio Indian Affairs.

THE MIDDLE PARK INDIAN AGENCY, COLORADO TERRITORY,
Denver, April 23, 1866.

DEAR SIR: I made a special report, dated February 12 last, in relation to a treaty with the Indians in my charge, forwarded by the governor on the 14th February, asking instructions, and as yet have received none. I wish you would take the trouble to inquire after it in the Office of Indian Affairs; and if there has been no action taken upon it, read it yourself, and you will understand the importance of early action. Unless a treaty is made with these Indians the coming summer we may expect trouble. Gold and silver were discovered in their country last year, and it is next to impossible to prevent prospectors and miners from going there. I would have written you some time ago in reference to it, but the governor seemed to think he would get an answer immediately.

Yours, truly,
Hon. ALLEN A. BRADFORD.

D. C. OAKES.

DEPARTMENT OF THE INTERIOR, OFFICE OF INDIAN AFFAIRS,
July 30, 1866.

SIR: Referring to office instructions of the 27th instant, directing you to hold councils with the Tabeguache and the Green River and Uintah bands of Utes, and to negotiate a treaty with the latter bands, I would state that, as the matter is one of great consequence, it would be desirable to have some one in addition to the agents associated with you in holding the councils.

The Hon. A. A. Bradford was requested to act with you in this matter; but owing to other engagements he was compelled to decline. It has therefore been determined to leave the selection of an associate commissioner in your hands, the department feeling assured that such selection will be made with the view to the best interests of the service.

Very respectfully, your obedient servant,

D. N. COOLEY, *Commissioner.*

Hon. A. CUMMING,
Governor, &c., *Continental Hotel, Philadelphia.*

General O. E. BABCOCK sworn.

By Governor CUMMING:

Q. General, were you ever in Colorado?

A. I was in May and June last.

Q. Were you in the Middle Park?

A. I was.

Q. At what period?

A. During the last week of May and first of June.

Q. By what route did you go into the Park?

A. I went by Vasquez Pass.

Q. By what mode of conveyance, general?

A. On foot.

Q. Was there any sign of a wagon road there?

A. Nothing within two miles of the top of the mountain. I should judge it to be two miles; that is on the north side, and no appearance of a road on the south side.

Q. Would it have been possible to have taken freight into the Park at that time with wagons?

A. No, sir.

Q. Have you ever heard of a design of making a road there at that time, or since?

A. I heard, at that time, Mr. John Jones said that he was going back to Denver to open books to build a road through this Pass, or the one just above it.

Q. By what route did you come out of the Park?

A. Through the Berthoud Pass,

Q. By what means?

A. On foot.

Q. Would it have been regarded as the act of a sane man to have attempted to take freight through there on wagons, at that time?

A. No, sir, it would not. You could not take empty wagons, either together or in pieces, on pack-mules, at that time. We tried to take our provisions on pack-mules and abandoned it.

Q. Have you any knowledge of a feasible route into that Park by wagons?

A. I have not, by any existing road.

WASHINGTON, D. C., *March* 1, 1867.

J. B. CASS sworn and examined.

By ALEXANDER CUMMING:

Q. Where is your residence?

A. I reside at Golden City, Colorado Territory.

Q. How long have you resided in Colorado?

A. Six years.

Q. What has been your business?

A. I have been engaged in the banking business most of the time, and in the grocery and also in freighting business.

Q. Did you do much in freighting?

A. Considerable.

Q. You have a general knowledge of the freighting business in that country?

A. Yes.

Q. Can you give any reliable information as to what freighting is there?

A. I can.

Q. What do you know of the general impression in that country as to the uneasiness about Indian troubles apprehended by the public mind, at the time this freighting was done?

A. There was great apprehension at the time.

Q. Do you know that extraordinary efforts were called for to keep them in good humor?

A. Yes.

Q. Do you know they appeared in Denver, indicating discontent and disappointment with the government?

A. I saw them there.

Q. Suppose in this instance you had been called upon to send goods to Middle Park to meet this emergency—taking the question of time into consideration—what would you think a fair price to take freight from Denver to Sulphur springs?

A. I should not like to take less than twenty-five cents per pound.

To the CHAIRMAN:

Golden City is fourteen miles from Denver. The price I fix was from the difficulty of taking the goods in a certain time there, and not from danger from the Indians.

E. M. ASHLEY recalled and examined.

By Mr. CUMMING :

Q. You said, a few days ago, five or six cents would be a fair price for freight ; by what road did you mean ?

A. By the Berthoud Pass.

Q. When were you over that road ?

A. In 1862. I have never seen wagons taken across there. I heard they were taken there during the Bay river mining affair.

Q. What do you know about the age of my son ?

A. I have seen him, and judged from that. I have never asked you his age, or asked his mother, and only guess at it.

To the CHAIRMAN :

It is the mire and mud in the Pass that makes the difficulty of travelling. I passed there the last of August or first of September, 1862. There was mud up to the horses' knees.

WILLIAM CRAIG sworn and examined.

By Mr. CUMMING :

Q. Where do you live ?

A. In Colorado Territory since 1864 ; and have been an officer in the army there. I was engaged in freighting through that region. There were great apprehensions of trouble with the Indians last summer there, and the inhabitants were urging the necessity of some action to pacify them. I know the point where the council was said to have been held, but was not there.

Q. What would you think a fair price for freight from Denver to that place ?

A. It would depend on the time you wished to get there. I would not have freighted it there for ten cents a pound when it came under the head of express freight, by mule train.

J. B. CASS recalled and examined.

By BRADFORD :

Q. Do you know M. B. Cumming ?

A. Yes ; she was not in Colorado the 1st July, 1st October, or 1st January last.

—— PATTERSON recalled.

Q. What is the condition of the Boulder Pass for freighting goods ?

A. It is a very bad Pass, and don't think you could get a wagon over it at all.

By Mr. BRADFORD :

Q. How far is it from Denver to the treaty grounds ?

A. I think about 100 miles.

To Mr. CUMMING :

I think it has been surveyed, but I know nothing about that ; I am speaking of the regular road.

A. C. HUNT recalled and examined.

By Mr. CUMMING :

Q. How did you load the wagons for carrying the freight ?

A. We had a telegram to get off as quick as we could, as the time had already been deferred three times, and we started one team at once. I went to Captain Mullen and he furnished the mule team, and he understood he was to get twelve cents per pound. All the rest were sent after ; ours were only half laden. If I was offered to-day fifteen cents or eighteen cents a pound I would not take it, except the job was big enough to build a road for it. I heard Mr. Carmichael, who brought the goods to Denver, make a verbal proposition, while he had the goods on his cars, to take them on for ten cents a pound.

To Mr. BRADFORD.

The voucher was put in one person's name, and he gave the rest their proportion out of it.

WILLIAM CRAIG recalled and examined.

By Mr. CUMMING :

Q. Was it not customary to have one man sign a voucher for service rendered for transportation, and then divide the amount with the others who were joined with him in the business.

A. We had men who signed vouchers for all, but it was not a customary thing.

S. J. TAPPIN recalled and examined.

By Mr. BRADFORD :

Q. In what capacity have you acted for the last four years in Colorado ?

A. Lieutenant colonel first Colorado cavalry.

Q. What would you consider a fair price for freight from Denver to Fort Gardiner ?

A. My impression is that, during the summer and fall of 1863, Mr. Post, the sutler, paid two to three cents a pound.

By Mr. CUMMING :

Q. You never paid this price yourself ?

A. No ; I have only the statements of others for it. One of the companies of my regiment brought their own freight that way. How it was done I don't know. I heard Mr. Post had some brought there, but it was done by Mexicans—return wagons. I know nothing about it personally.

WASHINGTON, D. C.,

Monday, February 25, 1867.

Mr. Bradford presented the following letter from Adjutant General Townsend, and depositions of David A. Chever, David H. Nichols, and George T. Crocker, which were received and made part of the testimony :

ADJUTANT GENERAL'S OFFICE,

Washington, February 22, 1867.

SIR : In reply to your request of the 19th instant, that you might be informed what service Brevet Major Lewis Thompson, captain second United States cavalry, was under, or what duty he was performing, during his sojourn in Colorado Territory, from November, 1865, to January, 1867, I have the honor to inform you that Brevet Major Thompson (then first lieutenant) was directed to report in person to the governor of Colorado for special duty.

The particular kind of duty he was performing is not known to the Adjutant General.

Very respectfully, your obedient servant,

E. D. TOWNSEND,

Assistant Adjutant General.

Hon. A. A. BRADFORD,

House of Representatives, Washington, D. C.

David A. Chever, being duly sworn, deposes and says that on or about the first day of January, A. D. 1866, he was clerk in the Colorado superintendency of Indian affairs ; that on or about that day, Alexander Cumming, superintendent of Indian affairs, in an interview, had by his own appointment in the private room of the governor, informed deponent that he was spending more money than he could afford, and that he must have the salary of the clerk of the superintendency ; that the exact words used by said Cumming in such relation were as follows, to wit : "I must have that eighteen hundred per annum ;" that deponent inferred that he was expected to resign, and that the said office of Indian clerk would be filled by a Mr. Thompson, a lieutenant in the United States army, at that time one of the governor's household. That the said Cumming at that interview expressed great desire to retain the services of the deponent in the Indian office, and offered to appoint him to the office of territorial librarian, the salary of which he promised to have increased, and also to use his influence to have increased the salary attached to the office of adjutant general of the Territory, at that time filled by deponent ; that shortly afterwards the office of auditor of the Territory was also offered to the deponent by the said Cumming, as a further inducement to remain in the Indian department ; that deponent did not elect to remain in said office, but did peremptorily resign said Indian clerkship, and emphatically refuse to accept the territorial offices above set forth ; that deponent did not at that time, nor for some time after, understand that he was expected to fill the office of Indian clerk, sign vouchers for salary of same, and pay said salary over to said Cumming, but that he has since so believed and does so believe at the present time.

DAVID A. CHEVER.

Subscribed and sworn to before me on this 8th day of February, A. D. 1867.

JOHN Q. CHARLES,

Notary Public.

David A. Chever, being duly sworn according to law, deposes and says that he is a resident of the city of Denver, and Territory of Colorado, and has been a resident of said city since the month of July, A. D. 1859.

Deponent further says that when Alexander Cumming, governor of Colorado Territory, came to the said Territory in the fall of 1865, he was accompanied by one Mary B. Cum-

ming, who was his reputed daughter; that the said Mary B. Cumming remained in the Territory until some time in the month of April or May, A. D. 1866, when she returned east with her reputed father, Alexander Cumming, governor of Colorado; that the said Mary B. Cumming has not resided in this Territory since the time of her said departure in the month of May, 1866; that this deponent knows of no other person in this Territory by the name of M. B. Cumming, and verily believes that there has been no one connected with the office of Indian superintendent of Colorado by the name of M. B. Cumming, unless it was the said M. B. Cumming aforesaid.

Deponent further says that he is and has been acquainted with the employés in and about the office of the superintendent of Indian affairs, and that he verily believes that the said Mary B. Cumming never acted in the capacity of clerk of the Colorado superintendency of Indian affairs, or in any other capacity in or about said office.

DAVID A. CHEVER.

Subscribed and sworn to before me on this 8th day of February, A. D. 1867.

JOHN Q. CHARLES, *Notary Public.*

TERRITORY OF COLORADO, *County of Arapahoe, ss:*

David H. Nichols, being duly sworn, on oath deposes and says that he is a resident of the city of Boulder, Colorado Territory, and has been since the month of May, A. D. 1860, and that he is over the age of forty years. Deponent further says that some time in the month of August or September, A. D. 1865, Alexander Cumming, governor of Colorado Territory, came to said Territory, and that his reputed daughter, Mary B. Cumming, came to said Territory with him; that said Mary B. Cumming remained in said Territory until some time in the month of April or May, 1866, when she left said Territory, with her reputed father, Alexander Cumming, governor, &c., and has not since returned to, or resided in, said Territory; that deponent is well acquainted with the people of this Territory and with the employés in and about the office of the said Alexander Cumming, governor as aforesaid, and that he knows of no other person in said Territory, or who has been employed in or about the office of the said Alexander Cumming, by the name of M. B. Cumming, excepting the said Mary B. Cumming. Deponent further says that he does not believe that the said Mary B. Cumming, aforesaid, ever acted in the capacity of clerk for the office of Indian superintendent of Colorado Territory, or in any other capacity in said office.

Further deponent saith not.

D. H. NICHOLS.

Sworn to and subscribed before me this 8th day of February, A. D. 1867.

ALEX. W. ATKINS, *Notary Public.*

TERRITORY OF COLORADO, *County of Arapahoe, ss:*

George F. Crocker, being duly sworn, on oath deposes and says that he is a resident of the city of Denver, Colorado Territory, and has been since the month of June, A. D. 1860, and that he is over the age of thirty-five. Deponent further says that some time in the month of August or September, A. D. 1865, Alexander Cumming, governor of Colorado Territory, came to said Territory, and that his reputed daughter, Mary B. Cumming, came to said Territory with him; that said Mary B. Cumming remained in said Territory until some time in the month of April or May, 1866, when she left said Territory, with her reputed father, Alexander Cumming, governor, &c., and has not since returned to or resided in said Territory; that deponent is well acquainted with the people of this Territory, and with the employés in and about the office of the said Alexander Cumming, governor as aforesaid; and that he knows of no other person in said Territory, or who has been employed in and about the office of the said Alexander Cumming, by the name of M. B. Cumming, excepting the said Mary B. Cumming. Deponent further says that he does not believe that the said Mary B. Cumming aforesaid ever acted in the capacity of clerk for the office of Indian superintendent of Colorado Territory, or in any other capacity in said office.

Further deponent saith not.

GEORGE F. CROCKER, *Attorney at Law.*

Subscribed and sworn to before me this 7th day of February, A. D. 1867.

ALFRED SAYRE, *Notary Public.*

Governor CUMMING presented the following statement:

WASHINGTON, D. C., February 28, 1867.

SIR: In reference to the vouchers, a list of which you handed me, I respectfully submit the following statement:

I presume that all the items in relation to the supplies and transportation for the two

councils with the Indians last summer are answered by the testimony of Mr. Hunt, confirmed by the testimony of others as far as it is applicable to the question.

First, that this business was all necessarily done in my absence, in accordance with the authority of the Indian department; and, secondly, as I believe, that the committee must have seen that the services were all faithfully performed and a full equivalent rendered for all moneys paid.

With regard to the rent, I have only to say, that I changed the offices of the executive and Indian superintendency in Denver, after consultation with the Hon. James M. Ashley, chairman of the Committee on Territories, in consequence of the inconvenience of the place formerly occupied, which was across Cherry creek and in a portion of the town that had been drowned out by inundation, and the greater part of it abandoned—many of the houses having been actually taken down and removed to the opposite side of the creek. It cost the Indian department more because the executive fund for that year had been nearly all expended by Governor Evans before I arrived in the Territory, although only about one-fourth of the year had expired. Mr. McClure, from whom the rooms were rented, is a public officer—assistant treasurer of the United States mint at that place. The vouchers are signed by himself, and are entirely regular. He always assured me that the rent was lower than he could get for the premises, and I believe he got more immediately upon my leaving them.

When I removed to Golden City, where the law locates the seat of government, I encountered considerable difficulty in obtaining rooms, and adopted the plan of renting rooms for several purposes together, and paying a fair proportion out of the Indian account. If these rents are deemed too high, I suppose the loss will fall on me, although the premises were occupied and used for the public service.

The vouchers for keeping the horses are, I suppose, fully and satisfactorily explained by General Brewster.

The charge for keeping the horses is in accordance with the usual rates there—less, I think, than they had previously cost.

The vouchers in relation to the stallion, I presume, are fully explained by the testimony of Mr. Hunt.

The charge by Mr. Hunt for his services I presume to be fully explained by him, in view of the authority given me for his appointment.

In relation to the voucher for expenses for superintendent, I have only to say, that I was informed that it was the practice of the department to pay the superintendent for reaching his post. I wrote to the Commissioner to know if this were so, and received a letter, in reply, saying that the charge was a usual one, and I accordingly made out a voucher.

The appointment of a clerk, as has been testified by Mr. Mix, is under the authority of the Indian department. During her absence the work was performed by her brother. The amount paid is the same as that allowed and paid for years past.

The work has been as well done as ever it was, and the government has received a full equivalent for the money paid.

If there is any impropriety or irregularity in this, the amount can be charged to me in any future settlement of my account.

In regard to the appointment of my son as secretary of the commission to hold a council with Indians, I have to say I was authorized to make the appointment by Judge Cooley, Commissioner of Indian Affairs.

I was asked by the Commissioner to undertake a most arduous duty, involving a vast deal of exposure and risk, and I was not willing to undertake it without some one along with me upon whom I could with confidence rely, and upon whom I could instantly call in any emergency. He rendered the service faithfully and earned the money, and I presume it is hardly the purpose of the government to exact his services for nothing.

I am under the firm conviction that no services in the Indian Department have accomplished so much, at so little cost to the government, as those in relation to the charges for which complaint has been made to the committee; and I believe, further, that this complaint has not originated in any desire to promote the public good, but has been intended to bring about measures that will supplant the present peaceful condition of things in Colorado, and substitute for it the old regime which led to the horrors of the Sand Creek massacre, and the reckless expenditure and waste of hundreds of thousands of dollars of public money. It is because I have steadily set my face against these attempts to foist upon the Territory a military force with a view to an Indian war, that these people who complain of me through its means might engage in plundering the public treasury, that I have been thus assailed. It is because I have assured the government constantly that no military force was needed there, and that the only thing required to enable me to maintain the peace of the Territory was that the Indians should be treated fairly, and the treaty stipulations fulfilled honestly by the government, which had not heretofore been done. My whole offence consists in this, and nothing more.

I have the honor to be, respectfully, your obedient servant,

A. CUMMING,
Governor, &c., Colorado Territory.

Hon. WILLIAM WINDOM, *Chairman, &c.*

THE HISTORY OF THE
LIFE OF
JAMES OGLETHORPE
BY
JOHN STURGES
IN TWO VOLUMES.
LONDON: PRINTED BY J. JOHNSON, ST. PAULS CHURCH-YARD, 1784.
IN TWO VOLUMES.
LONDON: PRINTED BY J. JOHNSON, ST. PAULS CHURCH-YARD, 1784.

CAPTURE OF JEFFERSON DAVIS.

EVIDENCE

SUBMITTED TO

THE COMMITTEE OF CLAIMS

BY THE

Claimants for the reward for the capture of Jefferson Davis.

MARCH 2, 1867.—Ordered to be printed

IN THE HOUSE OF REPRESENTATIVES,

January 15, 1867.

On motion of Mr. Cobb,

Resolved, That the Committee of Claims, to whom was referred the bill to authorize the payment of the reward offered by the President for the capture of Jefferson Davis, be instructed to ascertain and report to this House the facts connected with said capture, and the connection of the fourth Michigan and first Wisconsin cavalry regiments therewith, if any, together with the evidence taken in the case; and that in the prosecution of such investigation said committee shall have power to send for persons and papers.

Attest:

ED. McPHERSON, *Clerk*

WASHINGTON, D. C., January 27, 1867.

Having given all the orders and instructions, as commanding general of the cavalry corps, military division of the Mississippi, for the movement and disposition of the troops which resulted in the capture of Jefferson Davis and his suite, I have the honor to ask that a portion of the reward offered by the President under proclamation dated Washington, D. C., May 2, 1865, to which I am entitled under the law of prize, be paid to me.

I have also the honor to ask that the reward offered for the capture of Clement C. Clay, jr., under the same proclamation, or that part of it to which I am entitled, may also be paid to me, the said Clay having surrendered in person to me at Macon, Georgia, May 11, 1865.

The full facts and particulars in these cases are set forth in an official report, dated January 17, 1867, now in the hands of General Grant.

Very respectfully, your obedient servant,

J. H. WILSON,

*Lieut. Col. Thirty-fifth Infantry, Brevet Maj. Gen. U. S. A.,
late Maj. Gen. Vols., comd'g Cavalry Corps, M. D. M.*

CHAIRMAN of the Committee of Claims,
House of Representatives.

WASHINGTON CITY, D. C.,

January 27, 1867.

J. H. Wilson, lieutenant colonel thirty-fifth infantry, brevet major general United States army, late major general of volunteers, commanding the cavalry corps, military division of the Mississippi, in Georgia, having been called before the Committee of Claims, House of Representatives, deposes and says :

That while engaged in a campaign through Alabama and Georgia, in command of a corps of cavalry, designated above, and consisting of a force of nearly 15,000 men, during the months of April and May, 1865, he issued orders and made the necessary distribution of troops, under his own inspiration and in accordance with the instructions of the Secretary of War, for the purpose of securing the persons of such rebel chiefs as might be fleeing from the country by the roads in that section; that he obtained information from citizens while at Macon, Georgia, about the 23d or 24th of April, 1865, to the effect that Davis and his cabinet, escorted by several brigades of cavalry, had been a few days before at Charlotte, North Carolina, on their way to the trans-Mississippi department; that subsequently this information was confirmed, both by citizens and soldiers of his command, (cavalry corps, military division of the Mississippi;) that on or about the 4th of May, 1865, he received through Brevet Brigadier General A. J. Alexander, commanding first brigade of Upton's (fourth) division, and Brevet Brigadier General E. F. Winslow, commanding fourth division, information sent in by Lieutenant Joseph O. Yeoman, first Ohio cavalry, that Davis and his suite had reached Washington, Georgia, and from other sources (and on the 5th or 6th of May from the same source,) that the said Davis had given up his intention to go through northern Georgia and Alabama, and would probably turn to the south and try to escape by the way of the roads to Florida and the Gulf coast; and further, that upon this information, which he regarded as entirely reliable, he (Major General Wilson) ordered General Croxton, commanding the first division, cavalry corps, military division of the Mississippi, then at Macon, on the evening of May 6, to select his best regiment and best commanding officer, and order them to march at once by the way of Jeffersonville to Dublin, Georgia, and beyond, for the purpose of apprehending Jefferson Davis, and all other persons of note who might be trying to escape from the authority of the United States in that direction; that in accordance with these verbal instructions he selected a part of the first Wisconsin cavalry, commanded by Lieutenant Colonel Henry Harnden, and gave the necessary orders in pursuance of instructions; that this regiment marched without delay, and in all particulars, so far as made known by official reports and otherwise, was conducted by Colonel Harnden with discretion, vigor, and zeal, arriving at Dublin the next day about 7 p. m.; that Colonel Harnden there struck the trail of Davis and his party, and at an early hour on May 8 began the pursuit of the fugitives, following them through swamp and forest vigorously and persistently, crossing the Ocmulgee river at Brown's ferry, obtaining there information which left him no doubt that he was on the right trail. That Colonel Harnden met Colonel Pritchard and gave him the information which he had gathered, this at or near Abbeville, Georgia, on the 9th day of May, 1865. Further, that he, (General Wilson,) on the 7th day of May, having become thoroughly convinced that his previous information in regard to Davis's movements was entirely reliable, ordered Brevet Brigadier General R. H. G. Minty, commanding the second division of the cavalry corps, military division of the Mississippi, then in the vicinity of Macon, to select his best regiment and regimental commander and order them to proceed rapidly and without delay by the south side of the Ocmulgee river, to watch the crossings and patrol the country lying between Abbeville and the mouth of the Ohoopsee river, for the purpose of arresting Jefferson Davis and other important rebels; that in pursuance of these verbal instructions, duly transmitted, the fourth Mich-

igan cavalry, Lieutenant Colonel B. D. Pritchard commanding, was selected, and on the evening of May 7, 1865, began their march from Macon, meeting Colonel Harnden's regiment, as before mentioned, at or near Abbeville, May 9, 3 p. m. Further, that after a conversation between Colonels Harnden and Pritchard, somewhat variously reported, these two officers separated, the former to join his detachment already some time on the advance in the direct line to Irwinsville, (following Davis,) while the latter continued his march down the Ocmulgee, in pursuance of his instructions; that an hour after, Colonel Pritchard, having become convinced by additional information, said to have been obtained from a negro, that Davis had actually gone in the direction of Irwinsville, selected the twelve best men and officers of each company in his regiment, (seven officers and one hundred and twenty-eight men,) and began the pursuit by a road leading to Irwinsville by the way of Wilcox's mill; that he and his men captured Davis and suite, as previously reported and well known, about one and a half miles north of Irwinsville, on the morning of May 10. Further, that nearly at the same time the detachment of Colonel Harnden arrived upon the scene of action, ignorant of Pritchard's movement and good fortune, and in the dark, unable to recognize the uniform of Pritchard's men, became engaged with them; that this was probably no fault of Colonel Harnden, and could only have been avoided by Colonel Pritchard's sending a courier to inform Colonel Harnden of his intended movement the evening before; that he (General Wilson) does not intend to decide the fault or responsibility involved in this encounter, not having had either opportunity or time to order a proper investigation of the facts; that the characters of both Colonels Harnden and Pritchard were then, and he believes are now, above reproach; that no report of his (Gen. Wilson's) was ever intended to reflect upon either of them, so that the merits of the case depend entirely upon the facts involved in the pursuit and capture. Finally, that in view of the fact that his original reports and recommendations were not properly regarded, and, in consideration of the services of Lieutenant Yeoman, Colonel Harnden, and his men, he has recently recommended, in a full official report of all the transactions alluded to herein, that the two officers just mentioned are entitled to share and share alike with Colonel Pritchard and his officers, and that the men and officers of the first Wisconsin cavalry should at least receive medals of honor specially commemorating their services in the pursuit, the law which should govern this distribution being that usually applied in the distribution of naval prizes; and further, that under this law (which he does not pretend to construe) it would be much more equitable to count Colonel Harnden and his men, who were actually within the sound of gun-shot of the capture, among the persons entitled to share in the reward, than those men of Colonel Pritchard's regiment left on duty along the Ocmulgee river. Further, that he (General Wilson) has not been called before the commission which made the award, and of which General Townsend was president, and that all the facts set forth herein are true from the best of his knowledge and belief.

J. H. WILSON,

Lt. Col. 35th Inf'y, and Brevet Maj. Gen. U. S. A.,

late Maj. Gen. Vols., Com'd'g Cavalry Corps, M. D. M.

Sworn to and subscribed before the Committee of Claims, House of Representatives, on the 28th day of May, 1867.

C. DELANO, *Chairman.*

WASHINGTON, D. C., *January 27, 1867.*

SIR: I have the honor to request that in the examination of the claims for the reward offered for the capture of Jefferson Davis, the Committee of

Claims send for and use a report of Major General J. H. Wilson, forwarded to General Rawlins on or about the 21st instant.

General Wilson commanded the cavalry corps to which both the first Wisconsin and fourth Michigan regiments engaged in the capture belonged.

Very respectfully, your obedient servant,

H. E. PAINE.

Hon. COLUMBUS DELANO,
Chairman Committee of Claims.

WAR DEPARTMENT,

Washington, January 4, 1867.

SIR: In compliance with your request of January 28, I have the honor to transmit herewith a copy of General Wilson's report of January 17, respecting the capture of Jefferson Davis.

Very respectfully, sir, your obedient servant,

EDWIN M. STANTON,
Secretary of War.

Hon. C. DELANO,
Chairman of Committee of Claims.

DAVENPORT, IOWA, *January 17, 1867.*

GENERAL: As a matter of historical interest and in justice to my late command, the cavalry corps of the military division of the Mississippi, I have the honor to submit the following report of the pursuit and capture of Jefferson Davis, and to request that the same may be made a part of the official records of the War Department. This report is prepared from the original information in my possession, together with the official reports of the officers serving under me in the closing campaign through Alabama and Georgia.

It will be remembered that after the capture of Selma and the passage of my command to the south side of the Alabama, its march was directed to the eastward by the way of Montgomery, Columbus, and West Point, to Macon. On the evening of the 11th day of April, 1865, one of my officers brought in copies of the Montgomery papers of the 6th and 7th, containing the first news which had reached me of the operations of General Grant about Petersburg, and from which, making allowance for rebel coloring, I supposed he had gained a decisive victory. It was stated that Davis and the rebel government had already gone to Danville, but that their cause was not yet lost. On the 14th and 15th information was received confirmatory of Lee's defeat and the evacuation of Richmond; it was also reported that Grant was pressing the rebel army back upon Lynchburg. From these facts, together with the many rumors from all quarters indicative of unusual excitement among the rebels, I became convinced that they had met with a great disaster in Virginia, but as a matter of course I could obtain no definite or reliable information as to its extent or the probable course that would be adopted by the rebel government. I assumed, however, that they would either endeavor to concentrate their forces in North Carolina and make further head against our armies, or that they would disband and endeavor to save themselves by flight. In either case it was clearly the duty of my command to close in upon them on the line upon which it was moving, with the greatest possible rapidity, so as to join in the final and decisive struggle, or to assist in the capture of such important persons as might seek safety in flight. Accordingly our march from Montgomery to Macon, a distance of 235 miles, was made in less than six days, and included the passage of the Chattahoochee

and Flint rivers, and the capture of the two fortified towns of Columbus and West Point. In order to cover the widest possible front of operations, and to obtain such information in regard to rebel movements as might enable us to act advisedly, detachments were sent off to the right and left of the main column.

At Macon we were arrested by the armistice concluded between Generals Sherman and Johnston, though not until the city had fallen into our possession. During my conference with Generals Cobb and G. W. Smith, on the evening of the 20th, I received the first reliable information in regard to Lee's surrender and the course of events in Virginia.

The situation of my command was peculiar. Originally organized as a corps under General Sherman, the commanding general of the military division of the Mississippi, and not having been transferred, it still formed a legitimate part of his command wherever he might be. General Sherman, with the main body of his army, was at that time in North Carolina moving northward. Before leaving North Carolina he had instructed me to report with my entire corps, except Kilpatrick's division, to Major General George H. Thomas, to assist in the operations against Hood. It was the intention of General Sherman, however, as developed in frequent conversations with me while lying at Galesville, Alabama, in October, 1864, that, as soon as Hood could be disposed of, and my command could be reorganized and remounted, I should gather together every man and horse that could be made fit for service and march through the richer parts of Alabama and Georgia for the purpose of destroying the railroad communications and supplies of the rebels, and bringing my command into the theatre of operations towards which all our great armies were moving.

In the campaign terminating at Macon I had actually moved under the direct instructions of General Thomas, but with the "amplest latitude of an independent commander," transmitted through him from General Grant in person. I found myself cut off from all communication with these generals, but liable to receive orders from either or all of them, and from the Secretary of War in addition. My first duty was clearly to take care of the public interests and to reconcile orders afterwards, should they come in conflicting terms from different directions.

In anticipation of a final break up of the rebel forces, I had already determined to keep a sharp lookout for Davis and the leading rebel authorities. As soon as I became satisfied, by reliable instructions from General Sherman, that he had actually concluded an armistice, and intended it to apply to my command, I felt bound to observe it, but only upon the condition that the rebels should also comply with its provisions in equal good faith. One of those provisions was, that neither party should make any changes in the station of troops during the continuance of the armistice. My command while remaining in camp was therefore kept on the alert, and ready to move in any direction. Having heard from citizens, however, that Davis was making his way towards the south with an escort, I directed my command to take possession of the railroads, and to send scouts in all directions in order that I might receive timely notice of the rebel movements. The armistice was declared null and void by the President, but at least one day before I had been advised of this through General Thomas and General Gillmore, I received from General Sherman a cipher despatch informing me of the formal termination of hostilities by the surrender of General Johnston and all the forces under his command east of the Chattahoochee. This was on the 27th day of April. I had already taken precautions to prevent persons of importance from escaping by the railroads, and immediately upon the receipt of the final surrender I made disposition of my command for the purpose of taking possession of the important points in Georgia and paroling the rebel prisoners which might have to pass through them in order to reach their homes. I felt certain that Davis and his cabinet would endeavor to escape to the west side of the Mississippi river, notwithstanding the armistice and surrender, and therefore gave instructions to the different detachments of my command to look

out for and capture him and all other persons of rank or authority in the rebel government.

On the 28th of April, Brevet Major General Upton was ordered with a detachment of his division (the second) to proceed by rail to Augusta, while the balance of the division, under Brevet Brigadier General E. F. Winslow, was ordered to march by the most direct route to Atlanta—a regiment under Colonel B. B. Eggleston having been sent by rail to that place immediately after the receipt of General Sherman's telegram.

General E. M. McCook, commanding first division, with a detachment of 700 men, was directed to proceed by rail to Albany, Georgia, and march thence by the most direct route to Tallahassee, Florida, while General Croxton, with the balance of the division, was held at Macon, with orders issued subsequently to watch the line of the Ocmulgee river from the mouth of Yellow creek to Macon.

Brevet Brigadier General R. H. G. Minty commanding the second division, (General Long having been wounded at Selma,) was directed about the same time to send detachments to Cuthbert and Eufaula, to watch the line of the Ocmulgee from the right of the first division to Abbeville, and as much of the Flint and Chattahoochee to the rear as practicable. The ostensible and principal object of this disposition of troops was to secure prisoners and military stores, and to take possession of the important strategic points and lines of communication; but the different commanders were directed to keep a vigilant watch for Davis and other members of the rebel government.

The first direct information I received of Davis's movements was on the 23d of April from a citizen who had seen him at Charlotte, North Carolina, only three or four days before, and had learned there that he was on his way with a train and an escort of cavalry to the south, intending to go to the trans-Mississippi department. This information was regarded as entirely reliable, and hence the officers in charge of the different detachments afterwards sent out were directed to dispose of their commands so as to have all roads and crossings vigilantly watched. It was first thought that Davis would call about him a select force and endeavor to escape by marching to the westward through the hilly country of northern Georgia. To prevent this Colonel Eggleston was directed to watch the country in all directions from Atlanta. Brevet Brigadier General A. J. Alexander, with the second brigade of Upton's division, having reached Atlanta in advance of the division, was directed by General Winslow to scout the country to the northward as far as Dalton, or until he should meet the troops under General Steedman in that region. On beginning his march from Macon, General Alexander was authorized to detach an officer and 20 picked men, disguised as rebel soldiers, for the purpose of trying to obtain definite information of Davis's movements. This party was placed under the command of Lieutenant Joseph O. Yeoman, first Ohio cavalry, and at the time acting inspector general of the brigade. Verbal instructions were also given to other brigade and division commanders to make similar detachments. General Croxton was directed to send a small party towards Talladega by the route upon which he had marched from that place, while Colonel Eggleston was directed to send a party by rail to West Point.

By these means it was believed that all considerable detachments of rebels would be apprehended, and that such information would be obtained as would enable us to secure the principal rebel leaders, if they should undertake to pass through the country in any other way than as individual fugitives. In declaring the armistice of Sherman null and void the Secretary of War had directed that my command should resume active operations and endeavor to arrest the fugitive rebel chiefs. I accordingly notified him and General Thomas by telegraph of the dispositions I had made, and that I had no doubt of accomplishing the desired object, but having forwarded the records of my command to the Adjutant General's department, as required by army regulations, and been

denied copies of the documents relating to these matters, I cannot now fix the exact dates of these despatches.

After a rapid march towards the upper crossings of the Savannah river in northeastern Georgia, Lieutenant Yeoman's detachment met and joined Davis's party, escorted by Debrill's and Fergusson's divisions of cavalry, probably under Wheeler in person, and continued with them several days, watching for an opportunity to seize and carry off the rebel chief. He was frustrated by the vigilance of the rebel escort. At Washington, Georgia, the rebel authorities must have heard that Atlanta was occupied by our troops, and that they could not pass that point without a fight. They halted, and for some time acted with irresolution in regard to their future course. The cavalry force which had remained true to Davis, estimated at five brigades and probably numbering two thousand men, now became mutinous and declined to go any further. They were disbanded and partially paid off in coin, which had been brought to that point in wagons. Lieutenant Yeoman lost sight of Davis at this time, but dividing his party into three or four small detachments, sought again to obtain definite information of his movements, but for twenty-four hours was unsuccessful. Persevering in his efforts he became convinced that Davis had relinquished his idea of going into Alabama, and would probably try to reach the Gulf or south Atlantic coast, and escape by sea. Couriers were sent with this information to General Alexander, and by him duly transmitted to me at Macon. The same conclusion had already been forced upon me by information derived from various other sources, and from the nature of the case it seemed quite probable. With railroad communication through northern Georgia, and a division of four thousand national cavalry operating about Atlanta, it would have been next to impossible for a party of fugitives, however small, to traverse that region by the ordinary roads. This must have been clear to the rebels. From these circumstances I became fully convinced that Davis would either flee in disguise and unattended, or endeavor to work his way southward into Florida. With the view of intercepting him in this attempt, I directed the crossings of the Ocmulgee river to be watched with renewed vigilance, all the way from the neighborhood of Atlanta to Hawkinsville, and on the evening of May 6th I directed Brigadier General Croxton to select the best regiment in his division, and to send it under its best officer, with orders to march eastward *via* Jeffersonville to Dublin, on the Oconee river, with the greatest possible speed, scouting the country well to the northward, and leaving detachments at the most important cross-roads, with instructions to keep a sharp lookout for all detachments of rebels.

By these means it was hoped that Davis's line of march would be intersected and his movements discovered, in which event the commanding officer was instructed to follow wherever it might lead, until the fugitives should be overtaken and captured. General Croxton selected for this purpose the first Wisconsin cavalry, commanded by Lieutenant Colonel Henry Harnden, an officer of spirit, experience, and resolution.

During that day and the next the conviction that Davis would try to escape into Florida became so strong that I sent for General Minty, commanding second division, and in person directed him to select his best regiment and order it to march without delay to the southeastward, along the right bank of the Ocmulgee river, watching all the crossings between Hawkinsville and the mouth of the Ochoopee river. In case of discovering the trail of the fugitives they were directed to follow it to the Gulf coast, or till they should overtake and capture the party of whom they were in pursuit. General Minty selected for this purpose his own regiment, the fourth Michigan cavalry, commanded by Lieutenant Colonel Benjamin D. Pritchard, an excellent and dashing officer.

In the mean time General Upton, at Augusta, had sent me a despatch advising me to offer a reward of one hundred thousand dollars for the capture of Davis,

urging that the Secretary of War would approve my action, and that it would induce even the rebels to assist in making the capture. Not caring, however, to assume the responsibility of committing the government in this way, I authorized him to issue a proclamation offering a reward of a hundred thousand dollars to be paid out of such money as might be found in the possession of Davis or his party. This was done, and copies were scattered throughout the country as early as the 6th of May. As soon as it was known at Atlanta that Davis's cavalry escort had disbanded, General Alexander, with 500 picked men and horses of his command, crossed to the right or northern bank of the Chattahoochee river, occupied all the fords west of the Atlanta and Chattanooga railroad, watched the passes of the Allatoona mountains and the main crossings of the Etowah river, and, with various detachments of his small command, patrolled all the main roads in that region day and night until he received news of Davis's capture in another quarter.

The final disposition of my command may be described as follows: Major General Upton with parts of two regiments occupied Augusta, and kept a vigilant watch over the whole country in that vicinity, and informed me by telegraph of everything important which came under his observation. General Winslow, with the larger part of that division, occupied Atlanta and scouted the country in all directions from that place. General Alexander, with 500 picked men, patrolled the country north of the Chattahoochee, while detachments occupied Griffin and Jonesboro', closely watching the crossings of the Ocmulgee and scouting the country to the eastward. Colonel Eggleston, commanding the post of Atlanta, had also sent a detachment to West Point to watch the Alabama line in that quarter. General Croxton, with the main body of the first division in the vicinity of Macon, had sent a detachment, under my direction, to the mountain region of Alabama, marching by the way of Carrollton to Talladega, and another through northeastern Georgia towards North Carolina, and was also engaged in watching the Ocmulgee from the right of the fourth division to Macon, and in scouting the country to his front and rear. General Minty, commanding the second division, was scouting the country to southeast, watching the lower crossings of the Ocmulgee, and had small parties at all the important points on the southwestern railroad and in western and southwestern Georgia. Detachments of the seventh Pennsylvania cavalry occupied Cuthbert, Eufaula, Columbus, and Bainbridge, and kept a vigilant watch over the lower Flint and Chattahoochee, while General McCook, with a detachment of his division at Albany, and 700 men between there and Tallahassee, Florida, was scouting the country to the north and eastward. We also had rail and telegraphic communication from my headquarters at Macon with Atlanta, Augusta, West Point, Milledgeville, Etonton, Albany, and Eufaula.

By inspecting the map herewith it will be seen that my force of nearly 15,000 cavalry were occupying a well-defined and almost continuous line from Kingston, Georgia, to Tallahassee, Florida, with detachments and scouts well out in all directions to the front and rear. From this it will be difficult to perceive how Davis and his party could possibly hope to escape. From the time that they were reported at Charlotte till the final capture I was kept informed of their general movements, and was enabled thereby to dispose of my command in such a manner as to render their capture morally certain. As reported by General Winslow, rumors came in from all directions, but by carefully weighing them the truth became sufficiently manifest to enable me to act with confidence and decision. It is to be regretted now, however, that the hurry of events precluded the use of written orders. In nearly every instance my instructions were given verbally to the division commanders, and by them in turn transmitted verbally to their subordinates. Such written despatches and orders as were given are preserved in the records pertaining to the cavalry corps of the military division of the Mississippi, now on file in the Adjutant General's office.

In pursuance of my instructions to General Croxton, heretofore recited, Lieu-

tenant Colonel Henry Harnden, with three officers and one hundred and fifty men of the first Wisconsin cavalry, left Macon on the evening of May 6, 1865, and marched rapidly, via Jeffersonville, towards Dublin, on the Oconee river. At Jeffersonville Colonel Harnden left one officer and thirty-five men, with orders to scout the country in all directions for reliable information in regard to the route of Davis's flight. With the balance of his command he continued the march all night and the next day, about 7 p. m. reaching Dublin. During the night and day he had sent out scouts and small parties on all the side roads, in the hope of finding the trail of the party for whom he was looking. Nothing of importance occurred till after he had bivouacked for the night. The white inhabitants of that place expressed entire ignorance and indifference in regard to the movements of important rebels, but were unusually profuse in their offers of hospitality to Colonel Harnden. This, together with the conduct of the colored servants, excited his suspicions, though he gained no valuable intelligence till about midnight, at which time he was informed by a negro man, who went to his camp for that purpose, that Davis, with his wife and family, had passed through Dublin that day, going south on the river road. The negro reported that the party in question had eight wagons with them, and that another party had gone southward on the other side of the Oconee river. His information seems to have been of the most explicit and circumstantial character. He had heard the lady called "Mrs. Davis," and a gentleman spoken of as "President Davis," and said that Mr. Davis had not crossed the river at the regular ferry with the rest of the party, but had gone about three miles lower down and crossed on a small flat-boat, and rejoined the party with the wagons near the outskirts of the town, and that they had all gone towards the south together. The colored man reported Mr. Davis as mounted upon a fine bay horse, and told his story so circumstantially that Colonel Harnden could not help believing it. The ferryman was called up and examined, but, either through stupidity or design, succeeded in withholding whatever he knew in regard to the case. But in view of the facts already elicited, after detailing Lieutenant Lane and sixty men to remain at Dublin, and to scout the country in all directions, Colonel Harnden, at an early hour in the morning, began the pursuit of the party just mentioned. Five miles below Dublin he obtained additional information from a woman, which left him no room to doubt that he was on the track of Davis in person. He despatched a messenger to inform General Croxton of his good fortune, and pushed rapidly in pursuit. The trail led southward through a region of pine forests and cypress, almost uninhabited, and therefore affording no food for either men or horses. The rain began to fall, and as there was no road, the tracks of the wagon wheels upon the sandy soil were soon obliterated. A citizen was pressed and compelled to act as guide till the trail was again discovered. The pursuit was continued with renewed vigor, but, as the wagon tracks were again lost in the waters of the swamp bordering on Alligator creek, the pursuing party were again delayed till a citizen could be found to guide them to the road upon which the trail was again visible. Colonel Harnden reports this day to have been one of great toil to both men and horses. They had marched forty miles through an almost trackless forest, much of the way under the rain, and in water up to their saddle girths. They bivouacked after dark on the borders of Gum swamp, and during the night were again drenched by rain. Before daylight of the 9th they renewed their march, their route leading almost southwest, through swamp and wilderness, to Brown's ferry, where they crossed to the south side of the Ocmulgee river. In his anxiety to ferry his command over rapidly, Colonel Harnden allowed the boat to be overloaded. A plank near the bow was sprung loose, causing the boat to leak badly, and, as no means were at hand with which to make repairs, lighter loads had to be carried. This prolonged the crossing nearly two hours. Colonel Harnden learned from the ferryman that the party he was pursuing had crossed at about 1 a. m. that morning, and were only a few hours ahead of him on the road leading to Irwinsville. At Abbe-

ville, a village of three families, he halted to feed, and just as he was renewing his march he met the advance party of the fourth Michigan cavalry, Lieutenant Colonel B. A. Pritchard commanding, moving on the road from Hawkinsville. Ordering his detachment to continue its march, Colonel Harnden rode to meet Colonel Pritchard, and gave him such information in regard to Davis's movements as he had been able to gather. This was about 3 p. m. After a conversation between these officers, the precise details of which are variously reported, they separated—Colonel Harnden to rejoin his command, already an hour or more in advance, and Colonel Pritchard continuing his march along the south side of the Ocmulgee.

It will be remembered that Colonel Pritchard had begun his march from the vicinity of Macon, on the evening of May 7, under verbal orders given him by General Minty, in pursuance of my instructions. His attention was particularly directed to the crossings of the Ocmulgee river, between Hawkinsville and Jacksonville, and the mouth of the Ochoopee, with the object of intercepting Davis and such other rebel chiefs as might be making their way out of the country by the roads in that region. He had not gone more than three miles before he obtained such additional information in regard to the party as convinced him that it was his duty to join in the pursuit. In this he was clearly right, and had he done otherwise would have been censurable for negligence and want of enterprise.

Colonel Harnden having informed him that he had force enough to cope with Davis, Colonel Pritchard determined to march another road, leading to Irwinsville by a more circuitous route. Why he did not send a courier on the trail pursued by Colonel Harnden, to notify the latter of his intentions, has not been explained. This would probably have prevented the collision which afterwards occurred between his regiment and that of Colonel Harnden, and would not have rendered the capture of Davis less certain. This is not intended to reflect upon the conduct of Colonel Pritchard, for it is believed that this omission was simply an oversight which might have occurred to any confident and zealous officer. In carrying out the plan which he had adopted, Colonel Pritchard selected from his regiment seven officers and one hundred and twenty-eight men, and at 4 o'clock began the pursuit, leaving the balance of his regiment under the command of Captain Hathaway, with orders to picket the river and scout the country in accordance with previous instructions. The route pursued by Colonel Pritchard led down the river nearly twelve miles to a point opposite Wilcox's mill, and thence southwest for a distance of eighteen miles, through the pine forest to Irwinsville. He reached this place at 1 a. m. of the 10th, and by representing his command as the rear guard of Davis's party he succeeded in learning from the citizens that the party which he was searching for had encamped that night at dusk about a mile and a half out on the road towards Abbeville. Having secured a negro guide he turned the head of his column towards that place, and after moving out to within a half mile of the camp, halted, and dismounted twenty-five men under Lieutenant Purinton. This party were directed to move noiselessly through the woods to the north side of the camp, for the purpose of gaining a position in its rear, and preventing the possibility of escape. In case of discovery by the enemy they were directed to begin the attack, from wherever they might be, while Colonel Pritchard would charge upon the camp along the main road. Lieutenant Purinton having reached the point assigned him without exciting an alarm, the attack was delayed till the first appearance of dawn, at which time Colonel Pritchard put his troops in motion, and continued his march to within a few rods of the camp, undiscovered. Having assured himself of his position he dashed upon the camp without delay, and in a few moments had secured its occupants and effects, and placed a guard of mounted men around the camp, with dismounted sentries at the tents and wagons. No resistance was offered because the enemy had posted no sentries, and were therefore taken completely by surprise.

Almost simultaneously with this dash of Colonel Pritchard and his detach-

ment, sharp firing began in the direction of Abbeville and only a short distance from the camp. This turned out to be an engagement between the party under Lieutenant Purinton and the detachment of the first Wisconsin cavalry, which it seems had followed the rebel trail the night before till it was no longer distinguishable in the dark, had gone into camp only two or three miles behind the party they had been pursuing so long, and had renewed the pursuit as soon as they could see to march.

Both Colonel Pritchard and Colonel Harnden were informed that Davis had been reported as having with him a well-armed body-guard of picked men, variously estimated at from ten to fifty. They therefore expected desperate resistance, and hence in the collision which occurred the men of both detachments seemed inspired by the greatest courage and determination. It was several moments before either party discovered that they were fighting our own people instead of the enemy. In this unfortunate affair two men of the fourth Michigan were killed, and one officer wounded, while three men of the first Wisconsin were severely and several slightly wounded.

It is difficult, under the circumstances as detailed, to perceive how this accident could have been avoided; Colonel Harnden certainly had no means of knowing and no reason to suspect that the party whom he found in his front were any other than the rebels he had been pursuing, while Colonel Pritchard claims that he had cautioned Lieutenant Purinton particularly to keep a sharp lookout for the first Wisconsin, which he knew would approach from that direction.

The hurry with which my command was subsequently mustered out of service, and the absence of the principal officers, prevented an investigation of the details of this affair, and the circumstances which led to it. At this late day nothing more can be said of them than what is contained in the official documents already submitted, except that not the slightest blame was ever intended to be cast by me upon Colonel Harnden, as seems to have been assumed by the commission convened by the Secretary of War for the purpose of awarding the prize offered for the capture of Davis.

During the firing of the skirmish, just referred to, the adjutant of the fourth Michigan, Lieutenant J. G. Dickinson, after having looked to the security of the rebel camp, and sent forward a number of the men who had straggled, was about to go to the front himself, when his attention was called by one of the men to three persons in female attire, who had apparently just left one of the large tents near by, and were moving towards the thick woods. He started at once toward them and called out "halt," but not hearing him, or not caring to obey, they continued to move off. Just then they were confronted by three men, under direction of Corporal Munger, coming from the opposite direction. The corporal recognized one of the persons as Davis, advanced carbine, and demanded his surrender. The three persons halted, and by the actions of the two who afterwards turned out to be women, all doubt as to the identity of the third person was removed. The individuals thus arrested were found to be Miss Howell, Mrs. Davis, and Jefferson Davis. As they walked back to the tent from which they had tried to escape, Lieutenant Dickinson observed that Davis's high-top boots were not covered by his disguise, which fact, probably, led to his recognition by Corporal Munger. As the friends of Davis have strenuously denied that he was disguised as a woman, it may not be improper to specify the exact articles of woman's apparel which he had upon him when first seen by Lieutenant Dickinson and Corporal Munger. The former states that he "was one of the three persons dressed in woman's attire," and had "a black mantle wrapped about his head, through the top of which could be seen locks of his hair." Captain G. W. Lawton, fourth Michigan cavalry, who published an account of the capture in the Atlantic Monthly of September, 1865, states explicitly, upon the testimony of the officers present, that Davis, in addition to his full suit of confederate gray, had on "a lady's water-proof, (cloak,) gathered at the waist, with a shawl drawn over the head, and carrying a tin pail."

Colonel Pritchard says, in his official report, that he received from Mrs. Davis, on board the steamer Clyde, off Fortress Monroe, a water-proof cloak or robe, which was worn by Davis as a disguise, and which was identified by the men who saw it on him at the time of the capture. He secured the balance of the disguise the next day. It consisted of a shawl, which was identified in a similar manner by both Mrs. Davis and the men. From these circumstances there seems to be no doubt whatever that Davis sought to avoid capture by assuming the dress of a woman, or that the ladies of the party endeavored to pass him off upon his captors as one of themselves.

In addition to Davis and his family, Colonel Pritchard captured, at the same time, John H. Regan, the rebel postmaster general, Colonel B. A. Harrison, private secretary, Colonels Lubbock and Johnson, aides-de-camp to Davis, four inferior officers, and thirteen private soldiers, besides Miss Howell, two waiting maids, and several colored servants. As soon as breakfast could be prepared Colonel Pritchard, preceded by Colonel Harnden, began his march, with prisoners and wagons, for Macon, about 120 miles to the northwest of Irwinsville. The next day he met a courier with copies of the President's proclamation offering a reward of one hundred thousand dollars for the capture of Davis. This proclamation had been received and promulgated by me on the 9th, and hence the officers and men in pursuit of Davis were in no way inspired by the promise it contained. They performed their part from a higher sense of duty, and too much praise cannot be awarded to Colonels Pritchard and Harnden and the officers and men of their regiments who participated in the pursuit. Colonel Pritchard arrived at Macon on the 13th, and reported at once with his prisoners at corps headquarters. Arrangements had already been made, under instructions from the Secretary of War, for forwarding Davis to the north, *via* Atlanta, Augusta, and Savannah. Colonel Pritchard, with a detachment of his regiment, was directed to deliver his prisoners safely into the custody of the Secretary of War. I also placed in his charge the person of James B. Clay, jr., for whose arrest a reward had also been offered by the President. Mr. Clay surrendered himself to me at Macon about the 11th of May, having informed me, by telegraph from western Georgia the day before, that he would start for my headquarters without delay. A. H. Stephens was arrested by General Upton at Crawfordsville about the same time, and also placed in charge of Colonel Pritchard.

Brevet Major General Upton was charged with making the necessary arrangements for forwarding the prisoners and escort safely to Savannah, in the department of General Gillmore. These arrangements were successfully carried out, and the prisoners delivered at Fortress Monroe for safe-keeping on the 22d of May.

My command had also arrested Mr. Mallory, the rebel secretary of the navy, Mr. Hill, senator, and Joseph E. Brown, governor of Georgia. Breckinridge and Toombs managed to escape by travelling alone and as rapidly as possible, the former having passed through Tallahassee, Florida, only a few hours before the arrival of General McCook at that place.

Immediately after the capture of Davis the detachments and scouting parties of my command were assembled by their respective brigade and division commanders, and after paroling the bulk of the rebel forces, amounting to about 59,000 men, that had been serving in Florida, Georgia, North and South Carolina, the various regiments were ordered north to be mustered out.

From the foregoing narrative it will be seen that the first perfectly reliable information in regard to the movements of Davis was that sent in by Lieutenant Joseph O. Yeoman, of General Alexander's staff; that the route actually pursued by Davis and his party after leaving Washington was first discovered by Lieutenant Colonel Harnden at Dublin, and that the capture was actually made one mile and a half north of Irwinsville, Georgia, at dawn of May 10, by Lieutenant Colonel Benjamin D. Pritchard, with a detachment of seven officers and 128

men of the fourth Michigan cavalry. These facts should have been fully developed before this time, but owing to the disbandment of my command, it was impossible, till quite recently, to obtain the reports of subordinate officers. Colonel Pritchard made his report, by my orders, directly to the Secretary of War, but omitted till last month to send me a copy. Colonel Harnden's report, indorsed by Colonel La Grange and General Croxton, together with that of General Minty, were submitted in due time and forwarded to the Adjutant General's office. I forward herewith the reports of Generals Alexander and Winslow.

In my correspondence with the War Department just after the capture, I recommended, probably without due consideration, that the reward of one hundred thousand dollars offered by the President for the capture of Davis, (or that part of it remaining after the families of the men killed in the pursuit had been amply provided for,) should be divided according to the law of prize among the actual captors, and that Colonel Harnden and his men should receive medals of honor specially commemorating the part they had taken in the pursuit. This recommendation has not been carried into effect, but the commission, of which General Townsend was president, disallow the claims of Colonel Harnden, and recommend that the members of the fourth Michigan cavalry, scouting and picketing the Ocmulgee river over thirty miles north of Irwinsville, as well as "the actual captors," shall be included in the distribution of the reward, on the ground that they were performing service of a "most important precautionary character." With just as much reason every other man of the entire cavalry force then on duty in Georgia should also be included in the distribution, as they were performing service of "a most important precautionary character incidental to the immediate purpose of the expedition, and such as could not, without an imputation of neglect of duty, have been omitted to be provided for." Colonel Harnden and his detachment, who were actually within gun sound of the capture, certainly deserve more consideration in this case than any one who remained behind, no matter upon what duty he was engaged. I am therefore compelled, in equity and justice, to respectfully recommend, in the further consideration of this matter by the proper authorities, that the strict law of prize be observed. Under this law it seems to me that Colonel Harnden and Lieutenant Yeoman should receive share and share alike with the officers who were actually present at the capture; and I venture to hope that the men who accompanied Colonel Harnden to the vicinity of Irwinsville may at least receive the medals of honor heretofore recommended. In making this recommendation, I am not unmindful of the services performed by the balance of the corps, and desire to make special mention of Brevet Major General Emery Upton, Brigadier General Croxton, Brevet Brigadier Generals Winslow, Alexander, and Minty, and Colonels Eggleston and Howland. These officers and their commands performed the various duties assigned them with cheerfulness, intelligence, and zeal, and are entitled to the highest commendation.

I transmit herewith a map showing the railroads, rivers, and important points mentioned in this report, and from which the movements and dispositions of the troops under my command may be fully understood.

I am, sir, very respectfully, your obedient servant,

J. H. WILSON,

*Lieut. Col. Thirty-fifth Infantry, Bvt. Maj. Gen. U. S. A.,
late Maj. Gen. Vols., comd'g Cavalry Corps, M. D. M.*

Brevet Major General JOHN A. RAWLINS,

Chief of Staff U. S. A., Washington, D. C.

HEADQUARTERS ARMY OF THE UNITED STATES,

January 24, 1867.

Respectfully forwarded to the Secretary of War:

U. S. GRANT, *General.*

CINCINNATI, November 10, 1866.

DEAR SIR: I have the honor to make the following brief report of the operations of the fourth division cavalry corps, military department of the Mississippi, during the pursuit and capture of Jefferson Davis. Having at hand little data and no records, I cannot make the statement as full as I would like, but as the part taken by this division was auxiliary rather than successful, perhaps it is not very important that every detail should be preserved.

About the 1st of May, 1865, three hundred men, composed of about equal numbers of the third and fourth Iowa cavalry, were sent to Augusta, being accompanied by Brevet Major General Emery Upton, commanding the fourth division. The horses of this body of men were left with their respective regiments, and they went *via* Atlanta by railroad. They did not rejoin their commands until after the capture of Mr. Davis had been reported.

At or about the same time the first Ohio cavalry, Colonel B. B. Eggleston commanding, moved also from Macon to Atlanta, marching there in four days. Mean time the colonel had preceded the regiment by railroad, having with him a portion of his regiment. On arriving at Atlanta he, acting under orders from corps headquarters, assumed command of that city, his regiment acting as provost guard.

In obedience to orders received from yourself in person, I removed the remaining portions of the division towards Atlanta, leaving Macon on the morning of May 5, and marching that day five miles beyond Forsythe. Having your instructions to keep a lookout for Davis, I wished to gain the neighborhood of Atlanta as early as practicable, (keeping also in view the condition of my horses;) therefore moved the next day to Griffin, where I received from you the information that the ex-president was trying to escape across Georgia.

Leaving Griffin early on the morning of the 7th, I moved through Jonesboro' and bivouacked four or five miles north; being now near Atlanta, and in constant communication with Colonel Eggleston, who had scouts well out to the north and east, I had left one company, fourth Iowa, Captain Pray, at Griffin, and one company, third Iowa, at Jonesboro', with instructions to thoroughly scour the whole neighboring country, particularly to the east, and to at once communicate by couriers all credible information.

The most reliable information obtained to this time, and during the 8th instant, led me to believe that Davis had not yet approached the line of the Ocmulgee river and the towns west of the same. I frequently talked with persons who saw him at Washington, Georgia. Rumors without number now came from every direction, and if I had obeyed the impulses they gave rise to in almost every mind, I should soon have sent out my whole force by detail, and with the expectation that each squad or company would be on the right trail.

Believing, however, that I now held a central position to move either south, west, east, or northwest, I remained at this camp on the line of the railroad and waited more definite information, conveying to corps headquarters such as I deemed of moment or value.

Becoming convinced that Mr. Davis had not crossed my lines of communication, and that he had dispensed with any considerable escort, I moved on the 9th to Atlanta, and after consultation with Colonel Eggleston and General A. J. Alexander, decided to let the latter take two hundred men of his brigade (the second) and move up to hold the mountain passes on the line of the Western and Atlantic railroad as far as Allatoona or Kingston.

I now communicated again to the major general commanding corps my positive belief that Mr. Davis had not come west of the Ocmulgee north of Macon, and my further belief that he would endeavor to escape by going south on the east of that stream, (using as heretofore the telegraph mainly.)

I found that Colonel Eggleston had sent a force of the first Ohio cavalry

southwest to Alabama, acting in obedience to orders from his superiors, and at once directed him to recall the same.

I also communicated to Major General Upton the information I had, as well as my past and contemplated future action, receiving in return his full approval of all.

The entire country for several days' march from Atlanta was utterly destitute of food for man or horse; therefore rations for both must be taken for every movement. Before reaching Atlanta I had had rations prepared in that place for any movement likely to take place, and if there had been any real necessity I could have started with, say, one thousand well mounted men in any direction at very short notice.

The news of the capture of the great rebel soon reached us, and the entire force was early thereafter reassembled at and near Atlanta. This, general, in brief constitutes the account of the part taken by the fourth division in this effort, and though no apparent success attended the movements, perhaps they were conducive to that of the parties which did succeed. For my part I am quite willing that the entire credit of the operation shall rest with the expeditions from Macon eastward, and really think, as a commanding officer, I am more entitled to praise for withholding my force from dispersion and for keeping it in hand than for all that was done toward the capture. Regretting that I have not at hand more perfect information, yet trusting this story is long enough,

I am your obedient servant,

E. F. WINSLOW,
Late Brevet Brigadier General.

Major General JAMES H. WILSON.

FORT UNION, NEW MEXICO,
November 8, 1866.

GENERAL: In compliance with your request of October 14th, which has just reached me, I have the honor to make the following statement in regard to the capture of Jeff. Davis. Shortly after the armistice between Generals Sherman and Johnson, I was ordered to send one regiment of my brigade to Atlanta, rapidly, to apprehend Davis, who was reported moving in that direction with an escort of cavalry. I accordingly sent the first Ohio cavalry, (Colonel B. B. Eggleston commanding.) A few days after I was ordered to move to the same point with the remainder of my brigade. Previous to this movement I obtained permission from the major general commanding the corps to send an officer and twenty men, disguised in rebel clothing, to meet Davis, watch, and if possible capture him. This delicate operation I intrusted to Lieutenant Joseph O. Yeoman, a dashing young officer of the first Ohio cavalry, of great intelligence and coolness, and who was at that time acting as inspector general of my brigade.

Lieutenant Yeoman moved rapidly to northeastern Georgia, where he met and joined Davis's escort, consisting of Debrill's division of cavalry. He marched with them two or three days, but could not get an opportunity of seizing on the person of Davis on account of the close watch on every one who approached his person.

At Washington, Georgia, (I think,) the forces under Debrill heard that Atlanta was occupied by our troops, and that they could not pass that point without a fight; accordingly, disbanded during the night, and sought their homes in small parties. Lieutenant Yeoman scattered his men among the various bands to try and get some trace of Davis, but for twenty-four hours was unsuccessful. He finally found he had abandoned the idea of going into Alabama, and was making south to leave the country. Lieutenant Yeoman kept the command at Atlanta advised

of all his movements, and the commanding officer advised the major general commanding the corps by telegraph. When the information came to Atlanta that the command of Debrill had scattered, and that Davis was trying to escape in disguise, I took five hundred picked men and horses of my command, crossed to the right bank of the Chattahoochee, occupied all the fords below the railroad, the passes in the Allatoona mountains, and the main crossings of the Etowah river. I also patrolled the main roads day and night, arresting every one passing, until I heard Davis had been arrested by a regiment sent out by the major general commanding the corps.

I trust Lieutenant Yeoman will receive some recognition of his services, as he was the only officer who really risked his life; and I believe the information furnished by him caused the major general commanding to send out the party that made the arrest.

I am, general, very respectfully, your obedient servant,

A. J. ALEXANDER, *Capt. and Bvt. Colonel U. S. A.,
late Brevet Brig. Gen. Volunteers, commanding Second Brigade,
Fourth Division, C. C., M. D. M.*

Major General JAS. H. WILSON, U. S. A.

List of officers and enlisted men of the first Wisconsin cavalry engaged in the pursuit and present at the time of the capture of Jefferson Davis.

Lieutenant Colonel Henry Harnden.
Second Lieutenant Orson P. Clinton, company B.
Sergeant-major Walter O. Hargraves.
Private James Aplin, company K, orderly for Colonel Harnden.
Sergeant Austin M. Hove, company A.
Private David N. Bell, company A.
Private William Billsbeck, company A.
Private Martin M. Coleman, company A.
Private William Deyer, company A.
Private John Huntermer, company A.
Private Gotlieb J. Klineline, company A.
Private Sidney Leonard, company A.
Private James McStillson, company A.
Private George W. Silsbee, company A.
Private Christopher Stinebreck, company A.
Private Herbert Schelter, company A.
Sergeant Luther L. Blair, company B.
Sergeant Melvin T. Olin, company B.
Sergeant John Clark, company B.
Corporal Thomas B. Culbertson, company B.
Corporal James McCrary, company B.
Corporal Ezra H. Stewart, company B.
Private Albert L. Beardsley, company B.
Private Thomas Coleman, company B.
Private Rawson P. Franklin, company B.
Private Sylvester Fairbanks, company B.
Private William Gill, company B.
Private William Grimes, company B.
Private Lewis Jacobson, company B.
Private Hornore Leverner, company B.
Private William Matshie, company B.
Private Ira Miller, company B.
Private John Nolan, company B.

Private John Norton, company B.
 Private Warren P. Otterson, company B.
 Private Stephen Pouquette, company B.
 Private William A. Spangler, company B.
 Private Frederick Steinfield, company B.
 Private Joseph Smith, company B.
 Private George Wright, company B.
 Private John Wagner, company B.
 Sergeant George D. Hussey, company D.
 Sergeant J. M. Wheeler, company D.
 Corporal Gustavus W. Sykes, company D, wounded.
 Corporal L. Philip Pond, company D.
 Corporal Joseph Myers, company D.
 Corporal George La Borde, company D.
 Private Nelson Apley, company D, wounded.
 Private P. F. Anderson, company D.
 Private Donald Brandor, company D.
 Private F. Bublitz, company D.
 Private J. S. Burton, company D.
 Private Lawrence Bird, company D.
 Private Joseph Beguen, company D.
 Private A. J. Craig, company D.
 Private Thomas Day, company D.
 Private Thomas Dickerson, company D.
 Private Jerrod Fields, company D.
 Private James Foley, company D.
 Private Jacob Gosh, company D.
 Private D. H. Goodrich, company D.
 Private Lewis Harting, company D.
 Private N. M. Hephner, company D.
 Private C. Helgerson, company D.
 Private Henry Hamilton, company D.
 Private A. E. Johnson, company D.
 Private John Ludwick, company D.
 Private M. F. Nickerson, company D.
 Private P. W. O. Herron, company D.
 Private J. A. L. Pooch, company D.
 Private Alexander Pingilly, company D.
 Private Arne Renom, company D.
 Private Jerome Roe, company D.
 Private Herman Stone, company D.
 Private John Spear, company D.
 Private Henry Sidenburg, company D.
 Private J. H. Warren, company D.
 Private C. W. Seely, company D, wounded.

List of witnesses desired to have subpœnaed to be examined before the Committee of Claims upon hearing in regard to the reward for the capture of Jefferson Davis.

Orson P. Clinton, Waukesha, Wisconsin.
 James M. Aplin, Berlin, Wisconsin.
 Walter O. Hargrave, Ripon, Wisconsin.
 Clarke W. Seely, (unknown) Wisconsin.
 George W. Sykes, (unknown) Wisconsin.
 George D. Wright, Madison, Wisconsin.
 Colonel Henry Harnden, Madison, Wisconsin.

STATE OF WISCONSIN, *County of Waukesha* :

I, Orson P. Clinton, being duly sworn, on oath do say that I was second lieutenant of company B, first regiment of Wisconsin cavalry, and in command of said company during the pursuit and capture of Jefferson Davis. That I was with and belonged to the detachment of the first Wisconsin cavalry, under Lieutenant Colonel Henry Harnden, in said pursuit and capture. Colonel Harnden's command consisted of the effective force of the first battalion, first Wisconsin cavalry, numbering about one hundred and fifty men.

We left Macon, Georgia, about sunset, May 6, 1865. The object of the expedition I was unacquainted with. We crossed the Ocmulgee river and marched in a southeasterly direction. After marching a few hours we halted to fill our canteens and water our horses, when Colonel Harnden informed me that we were going to look after Jefferson Davis. We continued to march on through a sandy country until nearly morning, when we halted a few moments at a little village, and a detachment was left in command of Lieutenant Hewitt. We continued on as rapidly as possible through the day until about 3 o'clock p. m., May 7, when Colonel Harnden ordered me to take my company and go on a road towards Laurel Hill, which he said was about sixteen miles distant, and look after a carriage which we had heard of going in that direction. I executed the order and went about eight miles towards Laurel Hill, when I overtook the carriage and found it was driven by a planter. I then marched to Dublin and rejoined the main body of our men, arriving in the middle of the night. About 2 o'clock a. m., May 8, we were called up and ordered to prepare to march. Our horses were very tired, as the march the day before had been hard, with but few and short halts. A detachment under Lieutenant Lane was left at this place, and we changed our course towards the south. It was difficult to find the road, and it got to be light before we got fairly started. We now pressed on rapidly into a pine wilderness with but few inhabitants. It was raining in torrents, and we made frequent halts for the scouts to find the right way. Colonel Harnden informed me that he had got positive information of Jefferson Davis, and was going to pursue until he came up with him. We were much, all much encouraged, and pressed on eagerly. We made one halt during the day to feed corn. We passed through several swamps where the water was up to our saddlegirths. About 9 p. m. we halted and bivouacked on the edge of Gum swamp, about fifteen miles from the Ocmulgee river. Another storm came up during the night, wetting us to the skin. At 3 o'clock, May 9, we were up and on the march, reached the Ocmulgee river, and crossed on a small ferry. Here an unfortunate accident happened to the boat, which detained us an hour or two longer than we otherwise would have been. At a little place called Abbeville we halted to feed corn, starting again on a road to the south. Just as we were leaving the place, we saw some men dressed in our uniform coming from the north. Colonel Harnden spoke a few words with them, and then told me to keep on with the command on the Irwinsville road. The colonel then with his orderly rode off in the direction from which the men had come, while I went on with the command. In about half an hour the colonel overtook us at a gallop. We soon came to a fine stream of water, and the fires were burning where some party had halted to feed and cook provisions. After watering our horses we pressed on, hoping to overtake the party before dark, for we were satisfied, from the manner in which the party ahead of us had marched during the last two days, that some fugitives were fleeing from justice, and that Jefferson Davis was one of them. After marching until some time after dark, a halt was ordered, and pickets put out and the horses grazed, for we had no corn for our poor jaded horses nor rations for men. Colonel Harnden told me that we could not be far from the Davis party, and enjoined the strictest silence upon all. He told me the men we had seen back at Abbeville belonged to the fourth Michigan cavalry, and that they had camped at Abbeville. We talked about the probability of Davis having got across the river, for we supposed that we must be near

to the Allapahaw river, as placed upon our maps. The country was densely timbered with pine and we had not seen a hut in a dozen miles or more, nor an inhabitant. We were called up and resumed the march about 3 a. m., May 10, 1865. We had marched perhaps a couple of miles when a volley was heard a short distance ahead, which was followed by another. Shortly after our advance guard came back with three of them disabled and reported to the colonel. My position was in the rear of the column, and we were marching by twos. When the first volley was heard I ordered the men to get carbines ready, and the whole column started forward at a rapid trot; very soon the column came to a halt, and the advance company (D) was ordered into line and immediately dismounted and sent out to fight on foot. At this time an orderly came with an order for me to form a line on the right of our dismounted men, who were sharply engaged and driving the enemy to the right of the road into a swamp. I did so, and plainly heard Colonel Harnden call out to press them and not let Jeff. Davis escape. It was so dark that it was impossible to see the enemy, only by the flashes of their guns, up to this time. About this time I heard shouting and cheering ahead of us about half or three-quarters of a mile, I should judge. I was ordered to let my men remain mounted and move cautiously down the road. I had gone but a short distance when I saw a column of troops coming up the road, and ordering my men to fire upon them, I commenced moving toward them on a brisk trot preparatory to charging them. My getting the first fire upon them threw them into confusion, and they turned, retreated a short distance and commenced to form a line. When I discovered there were over a hundred of them and so informed Colonel Harnden, I halted, awaiting orders; meanwhile my men kept up a brisk firing, covering themselves by pine trees. The colonel then coming up with the dismounted men, ordered me to dismount and "fight on foot," which order I executed, and then we all advanced on the enemy, firing rapidly. Colonel Harnden now gave the order to prepare to charge on them, and the men were loading their carbines for a charge, when Colonel Harnden called out to "stop firing; they are our men." The firing stopped on both sides, when we mingled freely with their officers and men, and to our surprise found that they were the same men that we had seen back at Abbeville, and had supposed that they were in camp at that place. To our inquiries, "Have you Jeff. Davis?" they replied that a train was captured only a few rods away and across the strip of swamp, but who was with it they did not know. We were ordered to bivouac on the spot and look for our dead and wounded. It was only when Colonel Harnden came to me from the other side of the strip of swamp and said that Davis and family was captured that I was aware that the arch traitor was taken. As soon as our wounded men were brought from the rear—for we had none killed—I went over to see Davis. The swamp was but a little strip thirty or forty yards wide, and the distance to Davis's camp from where the fight terminated was probably seventy-five or one hundred yards. I saw Jeff. Davis and party and saw our colonel talking with him. I also saw Colonel Pritchard. The fourth Michigan cavalry had two men killed and two or three wounded. We had three wounded and one horse badly shot. There was a great deal said as to who was to blame for the collision. I do not, neither did I hear any one upon either side blame Colonel Harnden. No courier arrived or despatch was received by Colonel Harnden, to my knowledge, to apprise him of the proximity of others of our troops. I was with Colonel Harnden a great deal of the time, and had good facilities for knowing of any such information. I talked with a number of the men comprising the party who first fired into us, and they all said that they had no instructions as to the probability of our or any federal troops coming down that road. In talking with others they said that Colonel Harnden had not fairly got out of sight the day before, before Colonel Pritchard ordered a detail of 150 of his best mounted men, and taking the river road, marched all night and came into the road on which we were, at Irwinsville, ahead of us, and then came back on our road to within sight of Davis's camp-fires and made arrangements for his

capture and collided with us as described ; they seemed to be totally ignorant of our whereabouts, but simply obeyed their orders. They one and all attached the blame to their own colonel. I had under my command twenty-four men, and our whole force was but about seventy men including the colonel. I was the only commissioned officer except Colonel Harnden, with our party. This affair happened on the morning of the 10th of May, 1865, in Irwin county, Georgia. I knew nothing of any reward offered for Davis's capture until we were within a day's march of Macon, Georgia, on our return. There we met troops who handed us a copy of the reward offered. We arrived in Macon in the forenoon of May 13, 1865.

ORSON P. CLINTON.

STATE OF WISCONSIN, *County of Waukesha, ss :*

On this 22d day of October, A. D. 1866, before me personally appeared the above-named Orson P. Clinton, to me well and personally known, and subscribed the foregoing affidavit, and made oath that the same is true. I further certify that the said affiant is a respectable person, and entitled to credit.

In witness whereof, I have hereunto set my hand and affixed my seal notarial, the day and year above named.

VERNON TREHENOR,

Notary Public, residing in Waukesha county and State of Wisconsin.

STATE OF WISCONSIN, *Waukesha county :*

I, John Forbes, clerk of the circuit court in and for the county and State above named, do hereby certify that Vernon Trehenor, esq., before whom foregoing affidavit was made, and who has thereunto signed his name, was at the date thereof a notary public in and for the county and State aforesaid, duly commissioned and qualified, and authorized by law to administer oaths ; that all his official acts as such are entitled to full faith and credit, and that his signature thereto is genuine.

In testimony whereof, I have hereunto signed my name and affixed the seal of the said court, at Waukesha, this 22d day of October, A. D. 1866.

JOHN FORBES, *Clerk.*

STATE OF WISCONSIN, *Dane county, ss :*

Orson P. Clinton, being duly sworn, on oath deposes and says that he was second lieutenant of company B, first Wisconsin cavalry ; that on the 9th day of May, 1865, he (Clinton) was in command of company B, first Wisconsin cavalry, and with a detachment of said regiment, under command of Lieutenant Colonel Henry Harnden, and in pursuit of Jefferson Davis ; that the detachment above named crossed the Ocmulgee river at a ferry about two miles below Abbeville, and proceeded to the latter place, where the detachment was halted about an hour to feed the horses ; that as the command was leaving Abbeville, about two o'clock, p. m., some soldiers of the fourth Michigan cavalry came up on the Hawkinsville road ; that Colonel Harnden, attended by his orderly, rode out on the Hawkinsville road to meet the Michigan regiment, leaving him (Clinton) to press on after Davis, on the Irwinsville road ; that after the lapse of an hour or so, Colonel Harnden overtook the detachment ; that after marching from Abbeville, about eight or nine miles, the detachment came to the place where the Davis party had halted to feed their horses and cook some refreshments ; that they (the Davis party) had but recently left, as the fires were still burning ; that the detachment then pressed on as rapidly as possible, on the road towards Irwinsville ; that the country was almost an unbroken wilderness of pine woods, but the tracks of the wagons ahead could be plainly seen, and were followed without difficulty ; that about ten o'clock p. m. the detachment was ordered to halt for the night, and dismounted pickets put out. At about half past

two a. m., May 10, the march was resumed, his (Clinton's) company being in the rear. After marching about two miles a heavy volley was fired upon the advance of the detachment, which was soon followed by two other volleys from the same source; that the detachment was then rapidly formed into line, with his (Clinton's) company on the right, with orders to remain mounted; the balance of the detachment were dismounted, and commenced to fight on foot. At this time it was just growing gray in the east, but not light enough to distinguish the uniform of the enemy; that the firing was kept up for a short time with spirit on both sides, when the opposing force (who were dismounted) retreated to a swamp, which was on our right, and were pursued by a portion of the dismounted men of the first Wisconsin cavalry; that he (Clinton) was then ordered to move up the road and form on the left of the line, which he did; that at this time he (Clinton) heard loud cheering in front and apparently about one hundred rods distant; that he (Clinton) then saw a body of cavalry coming in the opposite direction, and engaged them; that he (Clinton) continued to advance and the enemy to fall back in considerable disorder, with sharp firing on both sides, until he (Clinton) received orders from Colonel Harnden to dismount his men and fight on foot, which he did, and then continued to advance until orders came from Colonel Harnden to stop firing, which was immediately followed by a cessation on the part of the opposing force; that the opposing force was now found to be the fourth Michigan cavalry, Lieutenant Colonel Pritchard, commanding; that he (Clinton) soon learned that Jefferson Davis was captured near at hand; that he (Clinton) then went a short distance and saw him (Davis) and family, together with other rebel prisoners. He (Clinton) further says that during the fight and up to the time the order to stop firing was received from Colonel Harnden, he (Clinton) supposed that their opponents were rebels, and had not any idea that any Union troops were nearer than Abbeville; that this affair took place about twenty-five miles south of Abbeville and near to Irwinsville, Georgia. He (Clinton) further says that he was told by several members of the fourth Michigan cavalry, who first fired upon the advance of the first Wisconsin cavalry, that they had no orders from the officers of their regiment to look out for the first Wisconsin cavalry; that he (Clinton) was also told by several members of the fourth Michigan cavalry who participated in the capture of Davis and party, that the loud cheering which he (Clinton) had heard took place at the time that the capture of said Davis and party was effected; that it was generally considered at the time by the men of both regiments, and was also, and now is, the opinion of himself (Clinton) that the collision and consequent bloodshed was the result of carelessness on the part of Colonel Pritchard in not sending a courier to notify Colonel Harnden of his (Colonel Pritchard's) having placed men across his (Colonel Harnden's) road, and of his (Colonel Pritchard's) previous movements. He (Clinton) further says that he saw and examined the ground at the camp of Davis and is confident that, had not the first Wisconsin cavalry been fired upon by the fourth Michigan cavalry, they (first Wisconsin cavalry) could and would have made the capture of Davis and train; that he (Clinton) is of the opinion that the collision was not the result of any carelessness or neglect on the part of the sergeant in command of the advance of the first Wisconsin cavalry, but that he (the sergeant) acted in a soldier-like manner in refusing, when challenged, to be captured by what he supposed to be the enemy; that the sergeant would have been guilty of criminal neglect had he not retreated when he found himself in the presence of what he must have supposed to be a strong rebel picket. And further deponent saith not.

ORSON P. CLINTON.

Subscribed and sworn to before me, this 15th day of February, A. D. 1867.

HERBERT A. LEWIS,

Clerk Circuit Court Dane County, Wisconsin.

STATE OF WISCONSIN, *County of Green Lake, ss:*

James J. Aplin, being duly sworn, upon his oath says that he is twenty-one years of age and resides at Berlin, in said county and State; that during the month of May, 1865, and for a long time previous thereto, he was and had been a private in company K of the first Wisconsin cavalry, and acting orderly for Lieutenant Colonel Henry Harnden, of said regiment, who was then in command of the same; that on the 9th day of said month of May a detachment of said regiment, under the order of Lieutenant Colonel Harnden, were in pursuit of Jeff. Davis, at a place called Abbeville, in the State of Georgia; that this affiant was with the said Colonel Harnden and said detachment in said pursuit; that on said 9th day of May, 1865, as said detachment was leaving Abbeville, a detachment of the fourth Michigan cavalry came up, commanded by Lieutenant Colonel Pritchard; that Lieutenant Colonel Harnden, attended by this affiant, remained behind until Colonel Pritchard came up, when Colonel Harnden introduced himself to Colonel Pritchard, and a conversation between them was had in regard to Jeff. Davis; that he (affiant) heard Colonel Harnden ask Colonel Pritchard if he knew anything about his (Jeff. Davis's) whereabouts, to which Colonel Pritchard replied that he had heard nothing about him whatever; Colonel Pritchard then asked Colonel Harnden what he knew about it, and he (Harnden) told him that he was in pursuit of Davis; that he had been informed by the ferryman, a short distance back, that he (Davis) was but six hours in advance; Colonel Harnden also told Colonel Pritchard that he believed Davis to be near, and that he was anxious to secure him; that Colonel Harnden asked Pritchard if he would pursue Davis, to which he replied that he would not, for he was ordered with his men to the river to patrol it; he said, also, that he was going into camp, and had stopped for that purpose; that, just as we were leaving, Colonel Pritchard asked Colonel Harnden if he intended to pursue Davis, to which Colonel Harnden replied that he would chase him to the Gulf of Mexico but that he would catch him; that Colonel Pritchard offered Colonel Harnden some of his men, but Colonel Harnden informed him that he had men enough to capture Jeff. Davis; that the two colonels were in conversation, as near as affiant could judge, about one-half hour; that, when Colonel Harnden and affiant left Colonel Pritchard, they rode on a slow trot until they overtook the said Harnden's command; should judge we rode about two and one-half miles before we came up with the troops, and went on with the troops until about ten o'clock, when the troops went into camp for the night. He further says that he knows that, in the said conversation had between the said colonels, Colonel Harnden gave Colonel Pritchard all the information in regard to Jeff. Davis that was in the possession of him and his men, and told him fully and unequivocally that he was in pursuit of Davis, and intended to capture him; the sun was about one hour high at the time of this conversation.

Affiant further says that, after the fight between said regiments, one of the fourth Michigan boys told him that he knew, and informed Colonel Pritchard during the fight, that they were fighting the first Wisconsin cavalry, and not rebels; that he knew us by our uniforms and the Spencer carbines which we carried; that Colonel Pritchard, after he had reported the fact to him the second time, told him that if he did not go back and fight he would have him put under arrest; did not know the name of this man; and further the said affiant says not.

J. J. APLIN.

Sworn and subscribed before me this 6th day of February, 1867.

GEO. D. WARING, *Notary Public.*

STATE OF WISCONSIN,

County of Green Lake, Office of the Clerk of the Circuit Court :

I, O. V. Russell, clerk of the circuit court for the county aforesaid, do hereby certify that George D. Waring, esq., whose name is subscribed to the annexed instrument, was, at the date thereof, an acting notary public, duly appointed and qualified, and by law authorized to take acknowledgments and administer oaths; that I am acquainted with the handwriting of said notary public, and verily believe the signature thereto purporting to be his is genuine; and I further certify that said instrument is executed and acknowledged according to the laws of this State.

Witness my hand and the seal of said court, at Princeton, this 7th day of February, A. D. 1867.

[SEAL.]

O. V. RUSSELL, *Clerk.*

STATE OF WISCONSIN, *County of Dane, ss :*

Personally appeared before me this 7th day of February, A. D. 1867, George D. Wright, late a private in company B, first regiment cavalry, Wisconsin volunteers, who, after being duly sworn, doth depose and say, that he was with his command and one of the detachment of the first Wisconsin cavalry which left Macon, Georgia, on the 6th day of May, A. D. 1865, under the command of Lieutenant Colonel Henry Harnden, and continued with the same until their return to Macon, after the capture of Jefferson Davis and party near Irwinsville, Georgia. That on the morning of the 10th of May the detachment he was with marched, at about three o'clock in the morning, in the direction of Irwinsville; that he was the third man from the right in his company, and near the right of the column; that after having marched not more than a mile, there was a volley fired in front, and in a very short time another volley, when we were moved up quickly into line; by this time the third volley had been fired at us, and I could distinctly hear the bullets whistling all about us, and striking the trees a little above our heads. At this time no firing had been done by our men. The dismounted men then moved forward and to the right of the road, firing rapidly as the enemy moved back, and to our right, into what appeared to be a swamp. We all commenced firing then briskly. I was third man, I think, from Lieutenant Colonel Harnden. Our men had fired but a few shots before I heard shouting or cheering a little way off in our front, and I said, "Hear the devils yell!" Albert Beardsley, who was beside me, said, "They are going for something now." We still kept on firing, and a bullet from those whom we supposed were rebs. struck my right boot, on the side of the heel, cutting away the leather. A few minutes after this I saw Sergeant Horr come running back from those who had driven the enemy off to our right, to Lieutenant Colonel Harnden, and heard him say, "We are fighting our own men; we have captured one man, and he belongs to the fourth Michigan!" We were then ordered to stop firing, and Colonel Harnden rode forward. He soon came back, and then Lieutenant Clinton went across the creek, and I went also, where we saw Jeff. Davis and party. After looking at the prisoners a short time I went back to where our line had been. Our men and some of the fourth Michigan were talking together, and I got into conversation with one of the Michigan men; I think he was a blacksmith. I asked him who it was hurrahing on the other side of the creek, and he told me "It was us when we captured Jeff. Davis." While looking around at the train captured and the horses, I said to a darky who was acting as a waiter, "You got waked up, did you?" He said "We nebber knowed nothing till you'uns begin shooting over dare." It was

hardly daylight when we were ordered to stop firing. After looking after our wounded men and getting some breakfast we started on our return to Macon, which place we reached during the forenoon of the 13th.

GEO. D. WRIGHT.

Sworn to and subscribed before me this 7th day of February, A. D. 1867.

[SEAL.]

CHAS. GEO. MAYERS, *Notary Public,*
Residing at Madison, Dane County, Wisconsin.

WASHINGTON, D. C., *January 28, 1867.*

Henry Harnden, late lieutenant colonel of the first Wisconsin cavalry, being called before the congressional Committee of Claims, and being duly sworn, deposes and says: That, on the 6th day of May, 1865, he (Lieutenant Colonel Harnden) was ordered to report in person at the headquarters of Brigadier General Croxton, commanding first division cavalry corps, military division of the Mississippi, at Macon, Georgia; that he (Lieutenant Colonel Harnden) did report forthwith as ordered, and received from General Croxton certain orders, to wit: To take one battalion of the first Wisconsin cavalry and proceed in search of Jefferson Davis; to march immediately; to go to Jeffersonville; from thence to Dublin; thence to go toward Millen, and on to the Savannah river, leaving detachments of men at the most important cross-roads; but, in case that he, Lieutenant Colonel Harnden, obtained any information of said Jefferson Davis, then to pursue and capture him (Davis) if possible. That, in obedience to such orders, he (Lieutenant Colonel Harnden) did detail one battalion of his regiment, consisting of one hundred and forty-eight men and three officers, and began his march from Macon, Georgia, at six o'clock p. m. May 6, 1865, proceeding to Jeffersonville, distance about twenty-five miles; he (Lieutenant Colonel Harnden) left Lieutenant C. Hewit, with thirty men, and proceeded with the balance of his command to Dublin, arriving about five o'clock p. m. May 7. Distance from Macon, fifty-five miles.

The day was intensely hot and roads sandy; the men and horses were much exhausted. The command bivouacked near the ferry. During the night information, which was deemed reliable, was received by Lieutenant Colonel Harnden from a negro man that some wagons had passed during the day through the town, and that they had gone south on the river road. This information was confirmed, yet later in the night, by another negro, who stated that the party was that of Jefferson Davis and his wife. The negro further stated that he had heard one of said party addressed as President Davis and one of the ladies as Mrs. Davis, and that they had come across the Oconee river ferry, and left Dublin, going south, about 12 o'clock (noon) that same day, which was May 7, 1865. Acting upon this information, he (Lieutenant Colonel Harnden) immediately detailed Lieutenant Lane, with forty-five men, to remain at Dublin and watch the ferry and patrol the cross-roads, starting himself with the balance of his command in pursuit of Davis.

On the outskirts of Dublin some delay was caused by the darkness and the difficulty in finding the right road, so that it was daylight before the pursuit was fairly commenced. When five miles from Dublin and at the crossing of Turkey creek, he (Lieutenant Colonel Harnden) obtained information which rendered it almost certain that Jefferson Davis was with the party ahead. The pursuit was now pressed with vigor, as the trail of the wagon could be plainly seen. The country through which this day's march led was a wilderness of pine woods and swamps, with scarcely any inhabitants. At the time of leaving

Turkey creek it commenced to rain and continued to fall heavily during the day. During a portion of the day the tracks of the wagons were lost, but by pressing a guide, he (Lieutenant Colonel Harnden) was enabled to continue the pursuit through the swamps of the Alligator creek and on until after dark, when the command bivouacked on the borders of Gum swamp.

Before daylight, May 9, the pursuit was begun and continued to the Ocmulgee river, where a crossing was effected about noon that day at Brown's ferry. At this point it was ascertained that the Davis party had left at one o'clock that morning, and gone in the direction of Abbeville, and to Abbeville the pursuit was continued, where it was ascertained that the Davis party had called at a house and inquired the way to Irwinsville, and the trail of the wagons led in that direction. They had passed before daylight. At this place a short halt was ordered to feed the horses with corn. Just as the command was leaving Abbeville, (the scouts had already gone on,) four men appeared in sight on the Hawkinsville road, dressed in the United States uniform. He (Lieutenant Colonel Harnden) inquired of them who they were, and was informed that they belonged to the fourth Michigan cavalry, Lieutenant Colonel Pritchard commanding; and that Lieutenant Colonel Pritchard, with his regiment, was advancing on the Hawkinsville road, and only a short distance away. He (Lieutenant Colonel Harnden) ordered Lieutenant Clinton to press on after the Davis party, and rode himself, attended by his orderly, to meet Lieutenant Colonel Pritchard. That, at meeting Lieutenant Colonel Pritchard, he (Lieutenant Colonel Harnden) introduced himself, and inquired if Lieutenant Colonel Pritchard had any information in regard to Jefferson Davis, and was told by Lieutenant Colonel Pritchard that he had none. He (Lieutenant Colonel Harnden) then gave to Lieutenant Colonel Pritchard all the information in his (Lieutenant Colonel Harnden's) possession in regard to Jefferson Davis, and informed him (Lieutenant Colonel Pritchard) that he (Lieutenant Colonel Harnden) with his command had struck the trail of said Davis and had been then two days in pursuit, and also that Davis, with a party and some wagons, had passed Abbeville that same morning and gone toward Irwinsville; and also that his (Lieutenant Colonel Harnden's) command had then gone on toward Irwinsville in pursuit.

He (Lieutenant Colonel Harnden) further informed him (Lieutenant Colonel Pritchard) that there was another party of confederates with wagons on the other side of the river, and that they, the confederates, probably were a part of Jefferson Davis's party, and that they would most probably try to cross the river below. He (Lieutenant Colonel Pritchard) then informed him (Lieutenant Colonel Harnden) that he (Lieutenant Colonel Pritchard) with his regiment were also out after Davis, but, up to that time, had heard nothing of said Davis, and also that he (Lieutenant Colonel Pritchard) had orders to encamp at Abbeville and patrol the Ocmulgee river and guard the ferries on said river. That he (Lieutenant Colonel Harnden) then parted with Lieutenant Colonel Pritchard, and, with his orderly, hastened on and rejoined his (Lieutenant Colonel Harnden's) command, and continued the pursuit of Davis in the direction of Irwinsville until some time after dark, (probably about 9 o'clock p. m. ;) when, coming to water, he (Lieutenant Colonel Harnden) ordered a halt and the horses to be grazed for a short time (as there was no corn) and some food prepared for the men, with orders that no noise should be made, and for all to be ready to start at three o'clock in the morning.

At three o'clock a. m., May 10, the march was resumed. He (Lieutenant Colonel Harnden) selected a sergeant and six picked men to lead the advance, and gave said sergeant particular instruction to proceed with caution, and to look out for the rebel pickets and report to him (Lieutenant Colonel Harnden) instantly the first indications that might be discovered of the enemy.

After marching a mile, or possibly two, the advance was suddenly ordered, by a voice a few yards ahead of them, to halt and dismount, when, instead of its

being obeyed by the sergeant, he endeavored to retreat. A heavy volley was fired upon them, (the sergeant and his party,) which was almost instantly followed by a second volley from the same unseen source, wounding three of the seven men composing the advance. That he (Lieutenant Colonel Harnden) then gave orders for his command to take the trot, dashing ahead at a gallop with ten men to reconnoitre, when another and third volley was fired upon the Wisconsin men. That at this time it was quite dark, and the opponents could only be seen by the fire from their guns. That he (Lieutenant Colonel Harnden) very soon formed a line, dismounting a part of his command, and pressed on the enemy vigorously, driving them into a swamp, which lay to the right of the first Wisconsin. At this time a large force of mounted men were seen approaching more to the left of the first Wisconsin men. That he (Lieutenant Colonel Harnden) ordered Sergeant How, of the first Wisconsin cavalry, with ten men, to pursue the dismounted force of the enemy, who had disappeared into the swamp aforementioned.

At this time it was getting to be light, and the enemy could be plainly seen. Brisk firing now took place between both parties, the enemy being gradually driven back. At this period of affairs Sergeant How came running to him, (Lieutenant Colonel Harnden,) saying that he (Sergeant How) had captured a prisoner, and that their opponents were the fourth Michigan cavalry. That he (Lieutenant Colonel Harnden) instantly gave orders to stop firing, which soon ceased on both sides. That he (Lieutenant Colonel Harnden) then rode a few yards and met Lieutenant Colonel Pritchard, and asked him (Lieutenant Colonel Pritchard) how he came to be there fighting them, (Lieutenant Colonel Harnden and his party.) Lieutenant Colonel Pritchard explained that after parting with Lieutenant Colonel Harnden the day previous, at Abbeville, he (Lieutenant Colonel Pritchard) had selected a portion of his best mounted men, and taking the river road, and then by the way of House mills, had arrived near Irwinsville, when, learning that a wagon party was camped out on the Abbeville road a short distance, he had sent a lieutenant and party of men dismounted across on to that road in the rear of the wagon party's camp, and that it was this party of his command that had fired upon them, (Lieutenant Colonel Harnden and his party;) and further, that while the fight was going on a portion of his (Lieutenant Colonel Pritchard's) command had captured the wagon train near at hand. That he (Lieutenant Colonel Harnden) then inquired if Jefferson Davis was captured. That Lieutenant Colonel Pritchard replied that he did not know who was captured. That he (Lieutenant Colonel Harnden) and Lieutenant Colonel Pritchard then rode in company across a narrow strip of swamp, a distance of about fifty yards, where they (Lieutenant Colonel Pritchard and Lieutenant Colonel Harnden) found Jefferson Davis and family, with other officials of the so-called confederate government, and wagon train, in the hands of and guarded by a portion of the fourth Michigan cavalry. That after resting a couple of hours or so, and caring for the wounded, both commands began their return march to Macon, arriving on the 13th day of May, 1865.

That he (Lieutenant Colonel Harnden) further says that he (Lieutenant Colonel Harnden) had received no intimation from Lieutenant Colonel Pritchard or any one else that he (Lieutenant Colonel Pritchard) intended to go to Irwinsville, or to pursue Jefferson Davis; but, on the contrary, was distinctly told by Lieutenant Colonel Pritchard that his (Lieutenant Colonel Pritchard's) orders were to camp at Abbeville and patrol the Ocmulgee river and guard the ferries; and further, he (Lieutenant Colonel Harnden) says that when first fired upon, and all during the fight, he sincerely believed that his opponents were the escort of Jefferson Davis; and that the first intimation which he (Lieutenant Colonel Harnden) had of there being any Union troops nearer than Abbeville was from Sergeant How, of the first Wisconsin cavalry; and further, he (Lieutenant Colonel Harnden) says that the collision and capture of Jefferson Davis aforemen-

tioned occurred near Irwinsville, Irwin county, State of Georgia, and twenty-five miles south of Abbeville aforementioned. That upon his (Lieutenant Colonel Harnden's) return to Macon, Georgia, on the 13th day of May, 1865, he made an official report to General Croxton, from whom he (Lieutenant Colonel Harnden) received his orders, of his doings during the pursuit and capture of Jefferson Davis. That said report was forwarded through the proper channels to the Adjutant General of the army, and said report is essentially the same and agrees with this statement.

And he (Lieutenant Colonel Harnden) further says that the collision with the fourth Michigan cavalry aforementioned, in his opinion, was not caused by any fault or negligence on the part of any member of the first Wisconsin cavalry; that the sergeant in command of the advance of the first Wisconsin cavalry acted as a soldier should always act under such circumstances, and that three distinct and heavy volleys were fired by the fourth Michigan cavalry before a shot was returned by the first Wisconsin cavalry, and that a constant firing was kept up by both parties from the time that the engagement commenced until he (Lieutenant Colonel Harnden) ordered the firing to cease on the part of the first Wisconsin cavalry; and further, it is the firm belief of him (Lieutenant Colonel Harnden) that had not the first Wisconsin cavalry been fired upon and checked for a time, they (the first Wisconsin cavalry) would have been in the camp of Davis and effected his capture as soon or even sooner than it was effected.

HENRY HARNDEN.

Sworn to and subscribed before me this 29th January, A. D. 1867.

C. DELANO,

Chairman Committee of Claims, House of Reps.

THE HISTORY OF THE
CITY OF BOSTON
FROM THE FIRST SETTLEMENT
TO THE PRESENT TIME
BY NATHANIEL BENTLEY
VOLUME I
PUBLISHED BY J. B. BENTLEY
1822

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ANNUAL REPORT

OF

THE BOARD OF REGENTS

OF THE

SMITHSONIAN INSTITUTION,

SHOWING THE

OPERATIONS, EXPENDITURES, AND CONDITION OF THE
INSTITUTION FOR THE YEAR 1866.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1867.

IN THE SENATE OF THE UNITED STATES.

MARCH 1, 1867.

Resolved, That five thousand additional copies of the report of the Smithsonian Institution for the year eighteen hundred and sixty-six, be printed; two thousand for the use of the Institution and three thousand for the use of the Senate; and that said report be stereotyped; *Provided*, That the aggregate number of pages contained in said report shall not exceed four hundred and fifty pages, without wood cuts or plates, except those furnished by the Institution.

IN THE HOUSE OF REPRESENTATIVES.

FEBRUARY, 28, 1867.

Resolved, That five thousand extra copies of the last report of the Smithsonian Institution be printed; two thousand for the Institution and three thousand for the use of the members of this House, and that the same be stereotyped.

LETTER
OF THE
SECRETARY OF THE SMITHSONIAN INSTITUTION,
COMMUNICATING

THE ANNUAL REPORT OF THE OPERATIONS, EXPENDITURES, AND CONDITION OF THE INSTITUTION FOR THE YEAR 1866.

SMITHSONIAN INSTITUTION,
Washington, February 26, 1867.

In behalf of the Board of Regents, I have the honor to submit to the Congress of the United States the annual report of the operations, expenditures, and condition of the Smithsonian Institution for the year 1866.

I have the honor to be, very respectfully, your obedient servant,
JOSEPH HENRY,
Secretary Smithsonian Institution.

Hon. L. F. S. FOSTER,
President of the Senate.

Hon. S. COLFAX,
Speaker of the House of Representatives.

ANNUAL REPORT OF THE BOARD OF REGENTS
OF THE
SMITHSONIAN INSTITUTION,
SHOWING
THE OPERATIONS, EXPENDITURES, AND CONDITION OF THE INSTITUTION
UP TO JANUARY, 1867, AND THE PROCEEDINGS OF THE
BOARD UP TO MARCH 1, 1867.

To the Senate and House of Representatives :

In obedience to the act of Congress of August 10, 1846, establishing the Smithsonian Institution, the undersigned, in behalf of the Regents, submit to Congress, as a report of the operations, expenditures, and condition of the Institution, the following documents:

1. The Annual Report of the Secretary, giving an account of the operations of the Institution during the year 1866.
2. Report of the Executive Committee, giving a general statement of the Smithsonian fund, and also an account of the expenditures for the year 1866.
3. Proceedings of the Board of Regents up to March, 1867.
4. Appendix.

Respectfully submitted:

S. P. CHASE, *Chancellor.*

JOSEPH HENRY, *Secretary.*

OFFICERS OF THE SMITHSONIAN INSTITUTION.

FEBRUARY, 1867.

ANDREW JOHNSON, *ex officio* Presiding Officer of the Institution.

SALMON P. CHASE, Chancellor of the Institution.

JOSEPH HENRY, Secretary of the Institution.

SPENCER F. BAIRD, Assistant Secretary.

WILLIAM J. RHEES, Chief Clerk.

RICHARD WALLACH, }
RICHARD DELAFIELD, } Executive Committee.

REGENTS OF THE INSTITUTION.

L. F. S. FOSTER, Vice-President of the United States.

S. P. CHASE, Chief Justice of the United States.

R. WALLACH, Mayor of the City of Washington.

L. TRUMBULL, member of the Senate of the United States.

GARRETT DAVIS, member of the Senate of the United States.

W. P. FESSENDEN, member of the Senate of the United States.

J. A. GARFIELD, member of the House of Representatives.

J. W. PATTERSON, member of the House of Representatives.

J. F. FARNSWORTH, member of the House of Representatives.

W. B. ASTOR, citizen of New York.

T. D. WOOLSEY, citizen of Connecticut.

L. AGASSIZ, citizen of Massachusetts.

RICHARD DELAFIELD, citizen of Washington.

MEMBERS EX OFFICIO OF THE INSTITUTION.

ANDREW JOHNSON, President of the United States.
L. F. S. FOSTER, Vice-President of the United States.
W. H. SEWARD, Secretary of State.
H. McCULLOCH, Secretary of the Treasury.
E. M. STANTON, Secretary of War.
G. WELLES, Secretary of the Navy.
A. W. RANDALL, Postmaster General.
H. STANBERRY, Attorney General.
S. P. CHASE, Chief Justice of the United States.
T. C. THEAKER, Commissioner of Patents.
RICHARD WALLACH, Mayor of the City of Washington.

HONORARY MEMBER.

O. H. BROWNING, Secretary of the Interior, (*ex officio.*)

PROGRAMME OF ORGANIZATION
OF THE
SMITHSONIAN INSTITUTION.

[PRESENTED IN THE FIRST ANNUAL REPORT OF THE SECRETARY, AND
ADOPTED BY THE BOARD OF REGENTS, DECEMBER 13, 1847.]

INTRODUCTION.

General considerations which should serve as a guide in adopting a Plan of Organization.

1. WILL OF SMITHSON. The property is bequeathed to the United States of America, "to found at Washington, under the name of the SMITHSONIAN INSTITUTION, an establishment for the increase and diffusion of knowledge among men."

2. The bequest is for the benefit of mankind. The government of the United States is merely a trustee to carry out the design of the testator.

3. The Institution is not a national establishment, as is frequently supposed, but the establishment of an individual, and is to bear and perpetuate his name.

4. The objects of the Institution are, 1st, to increase, and, 2d, to diffuse knowledge among men.

5. These two objects should not be confounded with one another. The first is to enlarge the existing stock of knowledge by the addition of new truths; and the second, to disseminate knowledge, thus increased, among men.

6. The will makes no restriction in favor of any particular kind of knowledge; hence all branches are entitled to a share of attention.

7. Knowledge can be increased by different methods of facilitating and promoting the discovery of new truths; and can be most extensively diffused among men by means of the press.

8. To effect the greatest amount of good, the organization should be such as to enable the Institution to produce results, in the way of increasing and diffusing knowledge, which cannot be produced either at all or so efficiently by the existing institutions in our country.

9. The organization should also be such as can be adopted provisionally; can be easily reduced to practice; receive modifications, or be abandoned, in whole or in part, without a sacrifice of the funds.

10. In order to compensate, in some measure, for the loss of time occasioned by the delay of eight years in establishing the Institution, a considerable portion of the interest which has accrued should be added to the principal.

11. In proportion to the wide field of knowledge to be cultivated, the funds are small. Economy should, therefore, be consulted in the construction of the building; and not only the first cost of the edifice should be considered, but also the continual expense of keeping it in repair, and of the support of the establishment necessarily connected with it. There should also be but few individuals permanently supported by the Institution.

12. The plan and dimensions of the building should be determined by the plan of the organization, and not the converse.

13. It should be recollected that mankind in general are to be benefited by the bequest, and that, therefore, all unnecessary expenditure on local objects would be a perversion of the trust.

14. Besides the foregoing considerations, deduced immediately from the will of Smithson, regard must be had to certain requirements of the act of Congress establishing the Institution. These are, a library, a museum, and a gallery of art, with a building on a liberal scale to contain them.

SECTION I.

Plan of organization of the Institution in accordance with the foregoing deductions from the will of Smithson.

TO INCREASE KNOWLEDGE. It is proposed—

1. To stimulate men of talent to make original researches, by offering suitable rewards for memoirs containing new truths; and,

2. To appropriate annually a portion of the income for particular researches, under the direction of suitable persons.

TO DIFFUSE KNOWLEDGE. It is proposed—

1. To publish a series of periodical reports on the progress of the different branches of knowledge; and,

2. To publish occasionally separate treatises on subjects of general interest.

DETAILS OF THE PLAN TO INCREASE KNOWLEDGE.

I. *By stimulating researches.*

1. Facilities afforded for the production of original memoirs on all branches of knowledge.

2. The memoirs thus obtained to be published in a series of volumes, in a quarto form, and entitled *Smithsonian Contributions to Knowledge*.

3. No memoir on subjects of physical science to be accepted for publication which does not furnish a positive addition to human

knowledge, resting on original research; and all unverified speculations to be rejected.

4. Each memoir presented to the Institution to be submitted for examination to a commission of persons of reputation for learning in the branch to which the memoir pertains; and to be accepted for publication only in case the report of this commission is favorable.

5. The commission to be chosen by the officers of the Institution, and the name of the author, as far as practicable, concealed, unless a favorable decision is made.

6. The volumes of the memoirs to be exchanged for the transactions of literary and scientific societies, and copies to be given to all the colleges and principal libraries in this country. One part of the remaining copies may be offered for sale, and the other carefully preserved, to form complete sets of the work, to supply the demand from new institutions.

7. An abstract, or popular account, of the contents of these memoirs to be given to the public through the annual report of the Regents to Congress.

II. *By appropriating a part of the income, annually, to special objects of research, under the direction of suitable persons.*

1. The objects and the amount appropriated, to be recommended by counsellors of the Institution.

2. Appropriations in different years to different objects; so that in course of time each branch of knowledge may receive a share.

3. The results obtained from these appropriations to be published, with the memoirs before mentioned, in the volumes of the Smithsonian Contributions to Knowledge.

4. Examples of objects for which appropriations may be made.

(1.) System of extended meteorological observations for solving the problem of American storms.

(2.) Explorations in descriptive natural history, and geological, magnetical, and topographical surveys, to collect materials for the formation of a Physical Atlas of the United States.

(3.) Solution of experimental problems, such as a new determination of the weight of the earth, of the velocity of electricity, and of light; chemical analyses of soils and plants; collection and publication of scientific facts accumulated in the offices of government.

(4.) Institution of statistical inquiries with reference to physical, moral, and political subjects.

(5.) Historical researches, and accurate surveys of places celebrated in American history.

(6.) Ethnological researches, particularly with reference to the different races of men in North America; also, explorations and accurate surveys of the mounds and other remains of the ancient people of our country.

DETAILS OF THE PLAN FOR DIFFUSING KNOWLEDGE.

I. *By the publication of a series of reports, giving an account of the new discoveries in science, and of the changes made from year to year in all branches of knowledge not strictly professional.*

1. These reports will diffuse a kind of knowledge generally interesting, but which, at present, is inaccessible to the public. Some of the reports may be published annually, others at longer intervals, as the income of the Institution or the changes in the branches of knowledge may indicate.

2. The reports are to be prepared by collaborators eminent in the different branches of knowledge.

3. Each collaborator to be furnished with the journals and publications, domestic and foreign, necessary to the compilation of his report ; to be paid a certain sum for his labors, and to be named on the title-page of the report.

4. The reports to be published in separate parts, so that persons interested in a particular branch can procure the parts relating to it without purchasing the whole.

5. These reports may be presented to Congress, for partial distribution, the remaining copies to be given to literary and scientific institutions, and sold to individuals for a moderate price.

The following are some of the subjects which may be embraced in the reports:*

I. PHYSICAL CLASS.

1. Physics, including astronomy, natural philosophy, chemistry, and meteorology.

2. Natural history, including botany, zoology, geology, &c.

3. Agriculture.

4. Application of science to arts.

II. MORAL AND POLITICAL CLASS.

5. Ethnology, including particular history, comparative philology, antiquities, &c.

6. Statistics and political economy.

7. Mental and moral philosophy.

8. A survey of the political events of the world; penal reform, &c.

III. LITERATURE AND THE FINE ARTS.

9. Modern literature.

10. The fine arts, and their application to the useful arts.

11. Bibliography.

12. Obituary notices of distinguished individuals.

II. *By the publication of separate treatises on subjects of general interest.*

1. These treatises may occasionally consist of valuable memoirs translated from foreign languages, or of articles prepared under the

* This part of the plan has been but partially carried out.

direction of the Institution, or procured by offering premiums for the best exposition of a given subject.

2. The treatises should, in all cases, be submitted to a commission of competent judges, previous to their publication.

3. As examples of these treatises, expositions may be obtained of the present state of the several branches of knowledge mentioned in the table of reports.

SECTION II.

Plan of organization, in accordance with the terms of the resolutions of the Board of Regents providing for the two modes of increasing and diffusing knowledge.

1. The act of Congress establishing the Institution contemplated the formation of a library and a museum ; and the Board of Regents, including these objects in the plan of organization, resolved to divide the income* into two equal parts.

2. One part to be appropriated to increase and diffuse knowledge by means of publications and researches, agreeably to the scheme before given. The other part to be appropriated to the formation of a library and a collection of objects of nature and of art.

3. These two plans are not incompatible with one another.

4. To carry out the plan before described, a library will be required, consisting, 1st, of a complete collection of the transactions and proceedings of all the learned societies in the world; 2d, of the more important current periodical publications, and other works necessary in preparing the periodical reports.

5. The Institution should make special collections, particularly of objects to illustrate and verify its own publications.

6. Also, a collection of instruments of research in all branches of experimental science.

7. With reference to the collection of books, other than those mentioned above, catalogues of all the different libraries in the United States should be procured, in order that the valuable books first purchased may be such as are not to be found in the United States.

8. Also, catalogues of memoirs, and of books and other materials, should be collected for rendering the Institution a centre of bibliographical knowledge, whence the student may be directed to any work which he may require.

9. It is believed that the collections in natural history will increase by donation as rapidly as the income of the Institution can make provision for their reception, and, therefore, it will seldom be necessary to purchase articles of this kind.

10. Attempts should be made to procure for the gallery of art casts of the most celebrated articles of ancient and modern sculpture.

* The amount of the Smithsonian bequest received into the Treasury of the United States is..... \$515, 169 00
Interest on the same to July 1, 1846, (devoted to the erection of the building) 242, 129 00
Annual income from the bequest..... 30, 910 14

11. The arts may be encouraged by providing a room, free of expense, for the exhibition of the objects of the Art-Union and other similar societies.

12. A small appropriation should annually be made for models of antiquities, such as those of the remains of ancient temples, &c.

13. For the present, or until the building is fully completed, besides the Secretary, no permanent assistant will be required, except one, to act as librarian.

14. The Secretary, by the law of Congress, is alone responsible to the Regents. He shall take charge of the building and property, keep a record of proceedings, discharge the duties of librarian and keeper of the museum, and may, with the consent of the Regents, *employ assistants*.

15. The Secretary and his assistants, during the session of Congress, will be required to illustrate new discoveries in science, and to exhibit new objects of art. Distinguished individuals should also be invited to give lectures on subjects of general interest.

This programme, which was at first adopted provisionally, has become the settled policy of the Institution. The only material change is that expressed by the following resolutions, adopted January 15, 1855, viz:

Resolved, That the 7th resolution passed by the Board of Regents, on the 26th of January, 1847, requiring an equal division of the income between the active operations and the museum and library, when the buildings are completed, be, and it is hereby, repealed.

Resolved, That hereafter the annual appropriations shall be apportioned specifically among the different objects and operations of the Institution, in such manner as may, in the judgment of the Regents, be necessary and proper for each, according to its intrinsic importance and a compliance in good faith with the law.

REPORT
OF THE
SECRETARY, PROFESSOR HENRY, FOR 1866.

GENTLEMEN: It again becomes my duty to present to your honorable board the history of another year of the Institution founded on the bequest of James Smithson, and intrusted by the Congress of the United States to your care. In presenting the following account of the events of the year 1866 I am gratified in being able to state that the fire which occurred at the beginning of the previous year, and which, at the time, appeared so disastrous, has, in reality, led to the adoption of measures for the increase and better security of the funds, and of changes of importance to the future efficiency of the means of carrying out the intentions of the benevolent testator.

It will be seen by the report of the executive committee that, by judicious investments and the sale of coin received from England as the residuary legacy of Smithson, as well as that of the annual interest from the United States, not only have the operations of the Institution been maintained, and the reconstruction of the building carried on without any aid from government, but the finances have been improved and are now in a better condition than at any former period. If the petition to Congress to permit additions to be made to the principal on the same terms as those on which the original bequest was received into the treasury of the United States be granted,* then the extra fund, at the present market value of the stocks in which it is invested, will be sufficient to increase the endowment from \$515,169 to \$650,000, and still leave enough to complete the general restoration of the building, provided the cost of the restoration be limited to \$150,000. For these results the Institution is much indebted to the personal exertions and influence of the Chancellor, Chief Justice Chase, to whom constant reference has been had during the past year in the management of the finances of the establishment.

Although the present condition of the fund is a matter of congratulation, yet there is another fact belonging to the history of 1866 of

* Congress passed an act February 8, 1867, in accordance with the above, allowing the Regents to increase the capital by savings, donations, and otherwise, to a million dollars.

equal if not greater importance, in regard to the future efficiency of the Institution. I allude to the transfer of the Smithsonian library for safe-keeping and support to the library of Congress. To those who have not fully considered the subject, it might, at first sight, appear that this transfer of a large number of rare and valuable books from the building of the Institution would be attended with serious inconveniences, and be a virtual relinquishment of the control of property procured at the expense of the Smithsonian fund. But it will be evident, on a statement of the facts, that the advantages accruing to the Institution and the public from the transfer far outweigh any inconvenience which may arise on account of it; and that it will tend to increase the efficiency of the funds, while it adds to the security and even facilitates the general use of the library.

Although the removal of the books renders them somewhat less accessible to those engaged in study and researches at the Institution, yet all the current transactions of the scientific Societies of the world, which constitute the principal part of the library, will be still received at the Institution. An opportunity will thus be afforded of noting their contents before they are sent to the Capitol, and such books will permanently be retained as are of most constant reference. In addition to this, the Institution is to have, at all times, the free use of the books of the congressional library as well as those of its own, and for this purpose, and the better accommodation of the public, the library of Congress is to be open throughout the year, with the exception of a month for cleaning and examination. Hence the general student, instead of being debarred any important privilege, will find increased facility for research in having access, in the same building, to both libraries. Again, the east wing of the Smithsonian building, in which the books were deposited, is not fire-proof, and is liable to destruction by accident or the torch of the incendiary, while the rooms of the Capitol are of incombustible materials. This wing was, moreover, filled to overflowing, and a more extended and secure depository could not be obtained, except by another large draught on the accumulated funds intended to form part of the permanent capital. Besides this, by the terms of the transfer, the cost of the care, binding, and cataloguing of the Smithsonian books is provided for by government, and an important part of the annual income of the Institution is thus saved for other purposes.

But the advantages of the transfer are not confined to the Institution. The library of Congress has secured such an addition as cannot be obtained by purchase, since many of the books are presents from the duplicates of the old libraries of Europe, consisting of trans-

actions and other publications of the learned societies of the world, forming a special collection, not only ranking as first in this country, but one of the best anywhere in existence. Neither is it alone the value of the books that have actually been transferred which is to be considered, but also the means which are offered, through our system of exchange, for the perpetual increase of the several series of works which contain the record of the actual progress of the world in all that essentially pertains to the mental and physical development of the human family. The transfer of the Smithsonian library has furthermore tended to awaken an interest in the library of Congress, which cannot fail, under the energetic superintendence of the present librarian, Mr. Spofford, in a few years to render it worthy of the national Capital. An appropriation of \$100,000 has been recommended* by the Joint Committee of the two houses of Congress for the purchase of the library of Mr. Peter Force, consisting of books relative to America. With these additions the library of Congress will be the largest in the United States, and the necessity of a separate building is even already foreshadowed.

But above all, the act authorizing the reception, care, and support of the Smithsonian library may be considered as an approval by Congress of the general policy adopted and the course pursued by the Institution. It will be recollected that at the commencement a number of influential literary men warmly advocated the expenditure of the larger portion of the income of the Smithsonian fund in the establishment and support of a library. This plan was opposed on the ground that the Institution by the terms of the bequest should be of a cosmopolitan character, and produce results, the benefits of which would not be confined to one city, nor even one country, and which could not be accomplished by a library. The act of organization, however, was so expressed as to give color to the idea that a large library was intended by Congress, and much complaint was at one time made because more of the income was not expended in the purchase of books. The late legislation of Congress will leave no ground for further cavil in regard to this point, and while the Institution will be relieved from a large expenditure on account of the library, a national collection of books will be formed far more extensive than could possibly be supported by the Smithsonian fund.

Moreover, while thus relieving the Institution from a charge which has borne so heavily on its resources, Congress has afforded most encouraging evidence of an important advance in public opinion regard-

* An act has been passed in accordance with this recommendation, and the library of Mr. Force is now the property of the government.

ing the right interpretation of the terms of the Smithson bequest. It is substantially a recognition by the national legislature of the fact that the Smithson fund ought not to be burdened with the support of objects which, while they absorb the income, are locally restricted in their influence, and neither essentially connected with the design, nor authorized by the language of the trust. Since Congress has eventually thought proper to assume the care of the library we may cherish the hope that in due time it will also make provision for the separate maintenance of a collection of objects of "nature and art," not unworthy of the National Capital; and that the proceeds of a fund, now generally recognized as having been intended by the testator for objects of a higher order than those confined to local or even national benefit, will be entirely devoted to the system of operations which an experience of nearly twenty years has abundantly shown to be the best and most practical means of realizing the design of the testator.

It is much to be regretted that views of this kind did not prevail at the time of the organization of the Institution, for had this been the case no small amount of the funds would have been saved, and unpleasant discussion been averted, the tendency of which could only be to obstruct and retard the full development of a system which now constitutes the distinctive and approved policy of the establishment. It is, however, scarcely a matter of surprise that Congress was not, at the time mentioned, prepared to appreciate the significance of the terms of the Smithson bequest, since the world generally has failed to recognize the importance of abstract scientific truths. Although these truths constitute the most important elements of modern civilization, since they give man power and control over the inherent forces of nature, and enable him to render these the obedient slaves of his will; yet, there is even at this time no country, however intelligent it may appear in other respects, that has made adequate provision for the discovery and development of these important principles. Our own legislators can give no better evidence of enlightened views and wise policy than a free acknowledgement of the claims of science, and a liberal provision for its encouragement and support.

The propriety of making provision for the separate maintenance of a national museum, and of relieving the Smithson fund from the burden imposed upon it in this way, will be evident when the fact is recalled that the plan of the present expensive building was adopted to accommodate the museum of the Wilkes' exploring expedition, the care of which had been devolved upon the Institution by the law of Congress. But the Board of Regents, after the building

was completed, decided that the keeping of this museum ought not to be a charge on the Smithsonian fund, and before assuming the care of it asked an appropriation, at least equal to the cost of keeping the articles while in the Patent Office. Congress recognized the propriety of this position, complied with the request, and has appropriated since the transfer, annually, \$4,000. This sum, however, has not sufficed to defray the cost of attendance, even during the period of low prices previous to the war, without allowing for any increase in the number of articles, or for the interest of the money expended on the building.

It is highly gratifying to observe that a more liberal spirit at present exists. Congress has recently made provision, on an ample scale, for the accommodation of an Army Anatomical Museum, and for a Museum connected with the Agricultural Department, and it can scarcely be doubted, that on a proper presentation of the subject, the same enlightened consideration which prompted the appropriations for these kindred objects, will also induce Congress either to appropriate the Smithsonian building to the use of a National museum, under a separate organization and endowment, or else to make an annual grant of money, which, expended under the direction of the Board of Regents, shall be sufficient properly to support an establishment of this kind.

The reconstruction of the building has been carried on during the past year as rapidly as the funds at command and a due regard to the character of the work would allow. The considerations which have governed the building committee have been to render the work entirely stable in regard to materials and construction and thoroughly fire-proof, first completing such parts as were necessary for the safety of the structure, and next those most wanted for use in the operations of the establishment.

One of the most important points to be determined during the year was the kind of roof to be adopted for the main building, and, after full inquiry, the preference was given to one consisting of an iron frame with slate covering. The contract for the iron work was made with the Phoenix Iron Company of Philadelphia, but, owing to unexpected delays the frame was not received in time before the setting in of frost to complete the covering with slate. The walls of the large south tower were found in a worse condition than was at first supposed, thirty feet of the height having to be removed and entirely rebuilt, the facing of cut stone being of new material. To secure the front towers and furnish supports for the iron beams and

brick arches for the floors, a lining of brick, laid in cement, has been constructed from the bottom to the top. The inner lining of the walls of the upper story of the main building, which was exposed to the fire, has also been entirely renewed with similar materials. The masonry of the whole building is now completed, and it is expected during the next season to finish all the rooms except the main hall over the museum. The future use of this room, which is 200 feet long by 50 feet wide, has not yet been settled. It will not be wanted for the uses of the Institution, and unless devoted to a National Museum or to some other purpose, it will probably remain for an indefinite time, unfinished. The reconstruction of the building, exclusive of this room, will cost about \$150,000, and if to this be added the sum previously expended on the erection of the building, we shall have a total of \$475,000, of which, at least, \$400,000 might have been added to the principal, or expended in the promotion of knowledge.

The superintendence of the work is still under the direction of the architect, Mr. Adolf Cluss, and every part of the construction and all the plans have been critically examined and discussed by General Delafield, chairman of the building committee, who has taken great interest, since his appointment, not only in the restoration of the building, but in all the operations of the Institution.

Publications.—The amount expended for printing during 1866 has been fully equal to that in any previous year, although the number of *new* works which have been issued is less. This has been occasioned by the high price of paper and printing, and by the necessity of issuing new editions of works for which the demand was more pressing.

The following is a list of the works in *quarto*, forming part of the series entitled "Smithsonian Contributions to Knowledge," published during the year 1866:

1. An Investigation of the Orbit of Neptune, with general tables of its motion, by Professor Simon Newcomb, U. S. navy, pp. 110. (Published January, 1866.)

2. Geological Researches in China, Mongolia, and Japan during the years 1862 to 1865, by Raphael Pumpelly, esq., pp. 161, 9 plates, 18 wood-cuts. (Published August, 1866.)

3. On the Fresh-water Glacial Drift of the Northwestern States, by Charles Whittlesey, esq., pp. 32, 2 maps, 11 wood-cuts. (Published December, 1866.)

Of other quarto works in press the following are nearly ready for distribution:

1. Astronomical, Magnetic, Tidal, and Meteorological Observations within the Arctic Circle, by Isaac I. Hayes, M. D.

2. Meteorological Observations made at Brunswick, Maine, for fifty-two years, by Professor P. Cleaveland, from 1807 to 1859.

The memoirs of Newcomb, Pumpelly, and Hayes were fully described in the report for 1865. It therefore remains to give the account of that of Mr. Whittlesey on the Fresh-water Glacial Drift of the Northern States, which will be found at the end of this report.

The following works in *octavo* were also published in 1866:

1. Catalogue of publications of societies and of periodical works belonging to the Smithsonian Institution, (January,) 596 pp.

2. Monograph of American Corbiculadæ, recent and fossil, by Temple Prime, (January,) 91 pp.

3. List of works published by the Smithsonian Institution, (January,) 11 pp.

4. New species of North American Coleoptera, by Jno. L. LeConte, pages 87 to 177, of part I, (April,) 90 pp.

5. List of the Coleoptera of North America, by Jno. L. LeConte, pages 50 to 78, (April,) 30 pp.

6. Check-list of the Invertebrate Fossils of North America, Eocene and Oligocene, by T. A. Conrad, (May,) 45 pp.

7. Review of American birds in the collection of the Smithsonian Institution. By Prof. S. F. Baird. Pp. 321-450 ; (May and June,) 130 pp.

The memoirs actually completed and issued in the year therefore embraced 303 quarto pages and 993 octavo pages, which, with the annual report, 496 pages, makes an aggregate of 1,792 pages printed within the year.

New editions of the following works have been issued during the same period: Allen's Bats; Binney's Land and Fresh-water Shells, parts II and III; Instructions for collecting specimens of Natural History; circular relative to nests and eggs; check-list of shells; comparative vocabulary; ethnological instructions; catalogue of minerals; check-list of fossils; Draper on the Telescope.

The most expensive octavo publication during the past year has been the catalogue of the transactions of learned Societies and other public bodies, as well as of encyclopedias and other serial works in the library of the Institution. The printing of this work was begun in 1863 and completed in 1866. During its passage through the press proof-sheets were sent to the principal Societies abroad, for the purpose, first, of securing accuracy in the titles; second, of showing the defi-

ciencies in our series, and thus enabling the Societies, as far as possible, to supply them. This work forms a large octavo volume of 596 pages. It has been stereotyped, and copies have been distributed to the principal libraries in this country and Europe, with a view mainly to obtain from them such duplicates as they may possess which may serve to render more complete the Smithsonian collection of transactions. The catalogue of the works thus obtained will be printed in an appendix, accompanied by proper indexes, when the whole will be issued and more generally distributed as one of the series of volumes of Smithsonian miscellaneous collections. From the stereotype plates an edition of this work has been struck off at the government printing office for the use of the library of Congress. This catalogue is considered the most complete work on the bibliography of publications of learned societies which has yet appeared in the English language.

Another article belonging to the octavo series is a catalogue of the eocene fossils belonging to the series of check-lists of invertebrate fossils of North America, prepared at the request of the Institution by Mr. T. A. Conrad, of Philadelphia. It contains an enumeration of all the species described from the eocene formation up to the date of publication, and is intended to facilitate the labelling of collections and the distribution of duplicate specimens.

The publication of two other parts of this series, prepared by Mr. F. B. Meek, namely, on the miocene, and on the cretaceous and jurassic species, were mentioned in a previous report.

The different series of check-lists published by the Institution have fully answered the purpose intended, in supplying a want long felt by students of natural history; and successive editions from the stereotype plates are required, the cost of which has formed a large item of the expenditure for printing during the past year.

Besides the foregoing articles 92 pages of an addition to the description of new species, and 30 pages of an addition to the list of coleoptera of North America, by Dr. John LeConte, have been printed during the year. These additions bring the works mentioned to the same point in regard to completeness as the first part of the classification of coleoptera by the same author, published by the Institution several years ago.

Another article, which will form a part of the miscellaneous collections, and printed during the year, is a list of all the works published by the Institution up to the beginning of the year 1866, enumerating 203 distinct titles, arranged under the following heads:

	Vols.
General series—Smithsonian Contributions	15
Smithsonian Miscellaneous Collections	5
Smithsonian Reports	14
	No. of papers.
Mathematics	1
Astronomy	21
Meteorology	17
Terrestrial Magnetism	11
Physics	3
General Physics of the Globe	2
Chemistry and Technology	3
Ethnology and Philology	16
Microscopical Science	4
General Natural History	3
Physiology	5
Zoology	37
Botany	9
Palæontology	9
Geology and Physical Geography	4
Bibliography	8
Architecture	1
Miscellaneous	1

Of many of the earlier of the separate publications the edition has been exhausted. Of those that remain copies can be procured, at the prices mentioned in the list, by institutions and individuals who do not come within the following rules of gratuitous distribution:

1. They are presented to all learned Societies of the first class which publish transactions, and give copies of these, in exchange, to the Institution.

2. To all foreign libraries of the first class, provided they give in exchange their catalogues and other publications, or an equivalent, from their duplicate volumes.

3. To permanently endowed colleges in actual operation in this country, provided they furnish in return meteorological observations, catalogues of their libraries and of their students, and all other publications issued by them relative to their organization and history.

4. To all States and Territories, provided they give in return copies of all documents published under their authority.

5. To all incorporated public libraries in this country, not included in any of the foregoing classes, now containing 10,000 volumes; and

to smaller libraries, where a whole State or large district would be otherwise unsupplied.

Institutions devoted exclusively to the promotion of particular branches of knowledge receive such articles published by the Institution as relate to their objects. Portions of the series are also given to institutions of lesser grade not entitled, under the above rules, to the full series; and also to the meteorological correspondents of the Institution.

The Reports are of a more popular character, and are presented—

1. To all the meteorological observers and other collaborators of the Institution.

2. To donors to its library or museum.

3. To colleges and other educational establishments.

4. To public libraries and literary and scientific societies.

5. To teachers or individuals who are engaged in special studies, and who make direct application for them.

In consideration of the growing expenses of the Institution, and the increasing demand for its publications, it may become necessary to restrict the gratuitous distribution, and to take measures to secure a larger sale by the usual methods adopted by publishers.

Reports.—The usual number of extra copies of the Report for 1865 was ordered by Congress, and, as has been the case for several years past, was stereotyped, so that future editions may be printed if required.

This volume contains, in addition to the report of the Secretary and the proceedings of the Board, the following articles:

A eulogy on General Joseph G. Totten, late Chief Engineer of the United States army, and a Regent of the Smithsonian Institution from its organization, delivered by Major General J. G. Barnard before the National Academy of Sciences; a Memoir of De Blainville, by Flourens, translated from memoirs of the the French Academy of Sciences; a report of the transactions of the Society of Physics and Natural History of Geneva for 1863 and 1864; an original article on the aurora borealis, with illustrations, by Professor E. Loomis; a translation from the German of an article on the senses of feeling and smell; a translation of a course of lectures by Professor Matteucci on electro-physiology; an essay on the palafittes or lacustrine constructions of the Lake of Neuchatel, by Professor E. Desor, of Switzerland, with notes and illustrations furnished by the author; a continuation of Plateau's researches on the figures of equilibrium of a liquid mass withdrawn from the action of gravity; an outline by Professor W. Lilljeborg, of Upsala, of the latest views of ornithologists in reference to the

classification and arrangement of the higher divisions of birds, and such as has been adopted in the museum of the Smithsonian Institution; prize questions proposed by various scientific societies in Europe; and an article on the metric system of weights and measures, with tables intended especially for the use of teachers and authors of arithmetics, prepared for the Institution by Professor H. A. Newton.

The translations are from French, German, and Italian scientific publications, not generally accessible to readers in this country, and most of them have been made by C. A. Alexander, esq., of this city, who has devoted much of his time, almost gratuitously, for a number of years, to this part of the literary work of the Institution.

We have found from experience that to obtain proper scientific translations is a very difficult matter. It is rare to find an individual having so critical a knowledge of languages, united with other requisite qualifications, as to render with fidelity and spirit such discursive popular explanations as are conveyed in the articles in the appendix to the Report for 1866 on the Senses. In this respect Mr. Alexander has evinced much ability. The meaning of the original is not only rendered with great accuracy, but with reference to peculiarities of expression on the part of the authors, and with a critical regard to the precision and correctness of the English.

It is proper to mention in this connection that we are indebted to the Superintendent of Public Printing for greater facilities than usual in the publication of the report, which, on account of the character of the articles, and their translation from foreign languages, requires more than ordinary time and care in revision.

Meteorology.—The system of meteorological observations inaugurated by the Institution, which was much interrupted by the war, is gradually being re-established, and as soon as the expenses for the restoration of the building are diminished we hope to carry it on more efficiently on an improved basis. The meteorological system under the direction of the Surgeon General is also in process of reorganization, and as soon as the military posts are permanently established it will be recommenced with improved instruments, and in harmonious relations with that of the Institution.

The following is an exhibit of the number of observers during 1866, as derived from the list given in the appendix: British America, 6; Mexico, 1; Central America, 3; Bermuda, 1; Alabama, 5; Arkansas, 2; California, 4; Colorado, 1; Connecticut, 5; Delaware, 1; Florida, 4; Georgia, 1; Illinois, 32; Indiana, 12; Iowa, 28; Kansas, 9; Kentucky, 5; Maine, 11; Maryland, 6; Massachusetts, 17; Michigan, 13; Minne-

sota, 9 ; Mississippi, 5 ; Missouri, 9 ; Montana, 1 ; Nebraska, 3 ; New Hampshire, 7 ; New Jersey, 14 ; New York, 35 ; North Carolina, 4 ; Ohio, 32 ; Oregon, 2 ; Pennsylvania, 23 ; Rhode Island, 2 ; South Carolina, 1 ; Tennessee, 3 ; Texas, 3 ; Utah, 5 ; Vermont, 7 ; Virginia, 2 ; Washington, 1 ; West Virginia, 2 ; Wisconsin, 15.

The whole number of observers is 352 ; of these 67 are furnished with complete sets of instruments, including barometer, thermometer, psychrometer, and rain gauge ; 331 with thermometers, 137 with barometers, 72 with psychrometers, and 227 with rain gauges, while ten report the face of the sky, direction of the wind, and casual phenomena without instruments.

The income of the Institution has not been sufficient to furnish instruments to observers, and hence from many of the stations the results are not strictly comparable with one another. There are, however, in almost every part of the country, one or more stations furnished with standard instruments, constructed by James Green, of New York, the observations with which may serve to determine the absolute variations of temperature, pressure and moisture at different localities, while the observations from the remainder give results comparable with themselves, and serve to determine the relative character of different seasons, as well as the data necessary for tracing the transmission of waves, as it were, of atmospheric disturbance with regard to wind, pressure and temperature.

The Institution has endeavored to collect the records of all meteorological observations which have been made on this continent, and has succeeded in obtaining a large amount of material, which will serve as the basis of an isothermal map of the country, as well as that of the peculiarities of climate of different sections. A portion of this, that, namely, which relates to the mean temperatures of years and seasons, was to have been published as the second part of the second volume of "Meteorological Results," issued some years ago by order of Congress, but the pressure of business on the public printing office in consequence of the war has as yet prevented the completion of the work. It will probably be published during the next year, either by Congress or the Institution.

Another portion of the material relates to long series of observations made at particular places. Of these we may mention the following : Those made by Prof. Caswell, at Providence, Rhode Island, for twenty-eight and a half years ; Dr. N. D. Smith, at Washington, Arkansas, for twenty years ; Prof. Cleaveland, at Brunswick, Maine, for fifty-two years ; Dr. S. P. Hildreth, at Marietta, Ohio, for forty-

one years; Prof. Z. Thompson, at Burlington, Vermont, for twenty-six years; Samuel Rodman, of New Bedford, Massachusetts, for thirty-six years.

Of the series, those of Caswell and Smith have been published in full, and those of Cleaveland and Hildreth are now in the hands of the printer, and will form a part of the sixteenth volume of the Contributions to Knowledge.

The "Monthly Bulletin of the Agricultural Department" still continues to contain a large amount of meteorological information derived from the reports of the Smithsonian observers. In preparing the materials for this a part of the time of Mr. Force, the assistant in charge of meteorology, has been occupied every month. This publication still continues to be of value to the farmer, and of interest to our observers, since it gives them a ready means of comparing their observations with those made in other parts of the country.

The anemometer, which for many years recorded the direction and intensity of the wind on the top of the high tower of the Institution, was destroyed with other instruments in the fire. As soon as the reconstruction of this tower is completed, one of Osler's anemometers will be erected in the same place. The use of one of these instruments, belonging to the National Observatory, has been kindly granted to us by the Secretary of the Navy. A standard barometer, by Newman, belonging to the Institution, now in the possession of Professor Guyot, will also be placed, with other instruments, in the same tower, and the full series of observations resumed.

The break in our series, however, is not of so much importance as at first sight it might appear, since a similar series has been kept up continually at the Observatory, which is a mile west of the Institution.

Exchanges.—The extensive system of international, scientific and literary exchanges, so long carried on by the Institution, has been fully maintained during the year. Eighty-three boxes, containing 1,170 packages, were sent to our foreign agents in 1866, and over 8,000 parcels received from them. These packages, as in former years, contain the publications of the Institution, public documents, transactions of societies and scientific works by individuals, besides specimens of natural history.

Acknowledgments are again due to the various steamship, railroad and express companies mentioned in the last report who have for a number of years contributed materially to the advance of science by the free freights and important privileges granted by them to the Institution in carrying on its system of exchange.

The agents of the Institution still continue to be Dr. FELIX FLUGEL, Leipsic, GUSTAVE BOSSANGE, Paris, WM. WESLEY, London, FREDERIC MULLER, Amsterdam.

Besides these gentlemen, Mr. JAMES SWAIM, now residing in Paris, has been appointed a special scientific agent for the purchase of philosophical apparatus and the transaction of other business, the duties of which he discharges gratuitously and to the great advantage of the Institution. We regret that notice of this fact was inadvertently omitted in the last annual report.

Explorations and collections.—As has been stated in previous reports, it is an important part of the operations of the Institution to encourage, assist and organize explorations for such portions of North and South America as have not been thoroughly investigated in regard to physical geography, climate and natural history. During the past year this part of the operations has been prosecuted with unabated energy, principally under the immediate supervision of Prof. Baird.

Those which have been made directly or indirectly under the guidance of the Institution, and more or less at its expense, are as follows:

British America.—Explorations and collections of specimens by officers of the Hudson's Bay Company in continuation of those of former years, especially those of Mr. Robert MacFarlane on the Anderson river, and of Mr. W. Brass, at Fort Halkett; Jas. Flett, at La Pierre's House; C. P. Gaudet, at Fort Good Hope; William L. Hardisty, at Fort Simpson; Strachan Jones, at Fort Rae; Jas. Lockhart, at Resolution; John Reed, at Big Island; Jas. Sibbiston and Rev. Jas. MacDonald, at Fort Yukon, and Donald Gunn, west of Lake Winnipeg; also in Labrador by Messrs. Henry Connolly and Donald A. Smith.

Russian America.—The explorations of the Collins extension of the Western Union Telegraph Company under Col. Charles L. Bulkley have been continued, and a large amount of interesting matter in regard to the ethnology, topography, and natural history of the country, collected principally by the following gentlemen has been received:

Colonel Bulkley, Captain Scammon, Dr. Fisher, Captain Sands, R. Kennicott, W. H. Dall, H. M. Bannister, J. T. Rothrock, Charles Pease, F. Bischoff, Lt. Davison, &c. Some of the collections in natural history were made by the members of this company in Kamtschatka and the western side of Behring straits.

Pacific Coast of the United States.—The explorations of J. G. Swan at Neeah bay, Puget sound, have also been continued with interesting results, as also those of Dr. C. A. Canfield at Monterey. Other explorations have been those of W. F. Schwartz, San Luis Obispo, Dr. Elliot Coues, San Pedro, and W. H. Dall, at Monterey.

Rocky Mountain Region of the United States.—The explorations of Dr. Coues and Dr. E. Palmer, in Arizona, mentioned in the last report, have been continued and completed. Dr. J. R. McKee, in New Mexico, Dr. Wernigk, in Colorado, have also made collections.

Eastern United States.—The explorations by Dr. H. B. Butcher on the lower Rio Grande, at Laredo, Texas, and by Dr. Redfield Sharp, at San Antonio; J. T. Cleu, at the Louisiana Salt Mines of Petit Anse island; in Illinois, by Joel Reeves, Robert Ridgway and Professor Henry Shimer, have all furnished interesting results.

West Indies.—The explorations here have been those of Charles Wright, in Cuba; A. E. Younglove, in Hayti; Mr. Geo. Latimer and Dr. Henry Bryant, in Porto Rico; Dr. Bryant, in the Bahamas; W. T. March, in Jamaica, and Mr. Allen, in Bermuda.

Mexico.—The explorations in this country have been those of Col. A. J. Grayson about Mazatlan and on the west coast; Dr. Charles Sartorius and Mr. Floretin Sartorius, at Mirador; Professor Sumichrast and M. Botteri, at Orizaba; Dr. Strebel, at Vera Cruz.

Yucatan.—The explorations in Yucatan of Governor Salazar, under direction of Dr. Arthur Schott, have been continued and completed.

Explorations have been made in Honduras by Dr. H. Berendt and D. B. Parsons; in Guatemala, by Mr. Henry Hague, about San Geronimo; in Nicaragua, by Dr. Earl Flint; in Costa Rica, by Dr. A. Von Frantzius, Hon. C. N. Riotte, Julian Carmiol, Juan Cooper and A. Zeledon; in Panama, by Captain J. M. Dow, J. and T. Rhoads, Dr. Totten and Dr. J. P. Kluge; in the Sandwich Islands, by Mr. Valdimar Knudsen. In South America, explorations have been made and collections transmitted by Mr. W. H. Hudson, in Buenos Ayres; Mr. A. De Lacerda, at Bahia, and Hon. A. A. Burton, at Bogota.

It should be stated in this connection that the expenses of the exploration in Honduras of Dr. Berendt have been principally met by contribution from the Chicago Academy of Sciences, Philadelphia Academy of Sciences, Dr. Henry Bryant, and Messrs. Geo. W. Riggs, W. A. Haines, H. Van Nostrand, C. M. Wheatly, R. L. Stuart, Prof. B. Silliman, Robt. L. Swift, J. H. Redfield and Thos. Bland.

For a more particular account of the nature of the contributions in natural history and ethnology reference may be made to the lists

and tables furnished by Prof. Baird in the Appendix. From these it appears that the number of entries during the year in the catalogues of specimens received is 7,254, which is about the usual annual average. Of these, nearly 4,500 were of birds.

As has frequently been stated in previous reports, the collections which are the result of the explorations made by the Institution or by the voluntary contributions of individuals, are not, primarily, intended to enlarge its museum, but for distribution to all the principal museums in the world and to furnish the materials for special researches. In accordance with this policy a distribution of over one hundred thousand labelled specimens, including 53,166 species, has been made during the year 1866 to museums and colleges where they were required for comparative investigation or as materials for instruction. Besides these distributions a large number of specimens have been intrusted to individuals for special study, viz: the insects to Baron Ostensacken, Dr. G. H. Horn, Edw. Norton, esq., W. H. Edwards, esq., and H. Ulke, esq.; the shells to P. P. Carpenter, esq., Thomas Bland, esq., Isaac Lea, esq., and George W. Tryon, esq.; the minerals to Prof. T. Egleston; the plants to Dr. John Torrey; the bats to Dr. H. Allen; infusorial earths to S. A. Bailey, esq.; birds to Jno. Cassin, esq., Geo. N. Lawrence, esq., and D. G. Elliot, esq.; nests and eggs to Dr. T. M. Brewer; reptiles to Prof. E. D. Cope; fossils to Dr. Jos. Leidy and F. B. Meek, esq.

In all cases in which specimens are presented to institutions or to individuals for investigation, full credit is required to be given to the name of Smithsonian for the benefits thus conferred.

Library.—During the past year the library has received from exchange and donation—

Volumes:

Octavo	922	
Quarto	226	
Folio	95	
		1,243

Parts of volumes and pamphlets:

Octavo	3,123	
Quarto	1,103	
Folio	283	
		4,509
Maps and charts		121
Total		5,873

Showing a large increase over the receipts during the previous year.

The following are some of the larger donations received in 1866:

From the Genevese National Institute, Geneva, 17 volumes, completing the "Memoirs" and "Bulletin;"

Royal Statistical Bureau, Munich, "Contributions to the Statistics of the Kingdom of Bavaria," vols. 2-15;

Society of Emulation for the study of the History and Antiquities of Flanders, Bruges—23 volumes of their publications;

Numismatic Society, London, "The Numismatic Chronicle," 21 volumes;

Ministry of Public Instruction, Paris, "Description of Egypt, published by order of Napoleon the Great," 21 volumes folio, and several other valuable works;

Library of the Parliament, Melbourne, 51 official documents, 1st volume of "Plants Indigenous to Victoria, Australian Mosses, No. 1," and other works;

Society of Agriculture, Sciences, Arts, and Belles-Lettres, of the Department of Indre and Loire, "Annals," 12 volumes;

Friesland Society of History, Antiquities, and Philology, Leuwarden, 10 volumes and 25 pamphlets;

Government of the Netherlands, 34 volumes and 45 pamphlets;

Belgian Entomological Society, Brussels, "Annals," vols. 1-8;

University of Chili, Santiago, 10 volumes;

Charles Kessler, Reading, Pa., "The Naturalist," vols. 1-22, 1774-1787;

Dr. G. J. Fisher, Sing Sing, N. Y., medical journals and other medical books, 77 volumes;

Dr. K. Koch, Berlin, 5 volumes and 336 pamphlets;

Professor C. J. Tornberg, Lund, Sweden, 11 volumes and 8 pamphlets.

From the Royal Library of Dresden we have received a series of 232 original discourses or theses and tracts, most of which were written by Luther, and the remainder by his contemporaries, and nearly all of which were published during the lifetime of the great reformer.

These tracts were referred to Rev. Dr. Morris, librarian of the Peabody Institute of Baltimore, for a translation of the catalogue, to whom we are indebted for the following remarks in regard to them:

"The majority of these brief treatises can be found in almost any entire edition of Luther's works, and are therefore not rare; but what renders this collection interesting to the bibliographer is, that they are all *first impressions*, and not reprints. The proofs were doubtless revised and corrected by his own hand, as most of them

were printed at places where he resided. They present specimens of paper and printing which are very creditable to the artisans of that day, ranging as they do from 1518, the year after the Reformation began, to 1546, the year of Luther's death. These writings have come to us in the same type and paper in which they were distributed by thousands over the land at the dawn of the Reformation. While the language in which they are written, both German and Latin, is not as refined as that employed by scholars of the present day, and while the pictorial illustrations are coarse, yet these productions show the extraordinary progress which the typographic art had already made in the early part of the 16th century. Many of them have the title pages ornamented with a broad margin of wood-cut figures, most of them mythological and grotesque, and all curious. They are specimens of the engraving of that day, exceedingly interesting to the student of the history of art, for these are undoubted originals, which collectors of ancient prints prize so highly. A few of them are unskilfully illuminated, probably executed by some incipient artist, who tried his hand on these coarse and cheap wood-cuts. The subjects of the pamphlets are diverse and curious, and the titles of many of those which are controversial, as was the general custom of that day, are expressed in language more forcible than refined."

Under the act of Congress mentioned in the last report, previously alluded to, the Smithsonian books have been transferred to one of the fire-proof rooms in the extension of the library of Congress, where they will be catalogued under the direction of Mr. Spofford, the librarian, and the large number of volumes in sheets will be bound at the government bindery. The continued new accessions to the library from foreign exchanges and otherwise are received and recorded at the Institution as formerly. The accessions from abroad do not alone consist of transactions of societies, but also, as has been shown in this and previous reports, of some of the most costly publications of foreign governments, and rare duplicates in the older libraries of Europe.

Correspondence.—A large amount of labor connected with the operations of the Institution is devoted to correspondence. Besides those relating to official business, hundreds of letters are received in the course of a year, containing inquiries relative to the various subjects on which the writers desire information. If these cannot be forthwith answered, without much research in the Smithsonian library, they are referred to our collaborators, who are experts in the different branches of knowledge, and who can readily supply trustworthy information in regard to the subjects within the range of their special studies.

During the past year we have made references of this kind to the following gentlemen, viz: Dr. Torrey, of New York; Prof. Agassiz, Dr. Gray, and Prof. Wyman, of Cambridge; Dr. Leidy and Mr. Isaac Lea, of Philadelphia; Professors Dana, Whitney, Brush, and Newton, of New Haven; Drs. Woodward and Craig, of the Surgeon General's office; Prof. Schaffer and Mr. W. B. Taylor, of the Patent office; Admiral Davis and Prof. S. Newcomb of the Naval Observatory: and Mr. George Gibbs, and Mr. J. H. Lane of Washington.

Investigations.—During the past year a considerable portion of my own time has been devoted to investigations connected with the revenue service, light-house board, and other branches of the government. These services, as well as those of a similar character in former years, have been entirely gratuitous, and may be considered in some degree as having tended to repay the care bestowed on the Smithsonian trust by the government in its character of guardian and trustee.

Lectures.—Since the burning of the upper story of the building in which the lecture room was situated, the public lectures have been discontinued. I have given, however, a course on electricity to the telegraphic association of this city, and also accepted, last autumn, an invitation to deliver the opening course of lectures at the Peabody Institute, in Baltimore. I was induced to accept this invitation contrary to my general habit, in order to present, from the experience gained in the management of the Smithsonian Institution, some suggestions which might be of importance in organizing the interesting establishment so liberally endowed by our distinguished countryman. The endowment of the Peabody Institute is \$1,000,000, nearly double the original Smithsonian fund, and sufficient, if the trust be wisely administered, to render the favored city celebrated throughout the world as a centre of literature and science. But I trust I shall be pardoned for saying, that in the case of the organization of a new institution, of which the purposes are not clearly defined, and which is entrusted to a board of trustees, it can scarcely be possible that the best course can be adopted at once. There will always be honest differences of opinion, and these will lead to compromises incompatible with a unity of plan, giving rise to difficulties in the future. The wisest course, therefore, in such cases, is to proceed cautiously, and on no account to adopt a plan which cannot be modified, or which shall call for any considerable expenditure of the principal of the endowment. I may, perhaps be allowed to say, that the publication of the remarks in full would probably be of importance in

diffusing information derived from the experience of the Smithsonian Institution, especially wanted at this time, when so many new institutions are about to be organized; but they would be out of place in this report, though they may be given in the appendix or elsewhere.

Whittlesey on the Drift.—The following is an account of the paper on the drift before mentioned which has not yet been described.

The term drift, as employed in geology, includes the collection of gravel, sand, clay, and stones occurring over portions of the continent without stratification or order of arrangement, and which have evidently been transported and distributed without the agency of rivers. For the study of this formation in the territory north of the Ohio river and east of the Mississippi to the national boundary, Mr. Whittlesey claims to have had special opportunities during the past twenty-five years. The length north and south of this area is about eleven degrees of latitude, from the 38° to the 49° , its breadth being quite irregular. Its eastern boundary is a line passing through the middle of the system of North American lakes, and to the west it extends at least to the Lake of the Woods. Over this space he has found what he considers but one formation, belonging to the post-tertiary, wholly of fresh-water origin, no remains as yet having been found of a salt water character, while to the eastward of Lake Erie, in the valleys of Lakes Ontario and Champlain, and the River St. Lawrence, the shells which occur are wholly marine. Further examination he supposes will show that the fresh-water formation overlaps the marine, and is consequently more recent. The thickness of the fresh-water drift is variable, in some places from 600 to 1,000 feet, though it seldom exceeds 200 or 300 feet. The author uses the term glacial drift to describe this formation as expressing what he conceives to be its origin in accordance with the theory originally proposed by Professor Agassiz, viz., an immense sheet of ice, at first principally confined to the pole of greatest cold, but gradually increasing its area by accumulations of snow in winter on its central part, and by the thawing in summer of the surface, the subsequent freezing and expansion of the infiltrated water producing a slow but almost resistless motion outward in every direction from the centre. This sheet of ice, like the modern glacier, having fragments of hard stone imbedded in its lower surface, would furrow and grind the rocks underneath—would bear on its upper surface, and within its interior, boulders and fragments of rocks which fell on it in its passage through mountain gorges, or which it tore from their sides, and, in addition to these, would carry with it the materials eroded in its passage; and finally, on melting,

would leave the whole in a condition identical with that in which the drift formation is found. This formation, according to the author, may be divided into three members, in the order of superposition, from the surface downward, composed as follows: The first of coarse sand, gravel, loam, and hard-pan, with large boulders from northern rocks, exhibiting little stratification. The second of sand and gravel, less coarse than the preceding, with irregular bands of clay somewhat laminated, and smaller boulders. The third of fine laminated sand, of marly clay of great thickness, of various colors, with few boulders and little gravel. Wherever a sufficient thickness of drift occurs these divisions can be readily traced, and always in the same order. The first occupies the highest points of land, and frequently lies upon the rock formation without the intervention of the other beds, and in it occur moraine hillocks and depressions intermingled with the underlying strata at different points, indicating the movement of ice, which, while it brought materials from a distance, ploughed up and pulverized the previously existing surface.

This upper member of the drift contains the coarsest material and the largest and most numerous boulders, a fact inexplicable on any other theory excepting that of their deposit by the melting of glaciers carrying on their surface the heavier masses. The surface is pitted with cavities extending below the general level ten, fifteen, and even a hundred feet, their outline being rudely circular, and their sides as steep as is compatible with the stability of the soil. In travelling through this region the explorer frequently finds these hollows so near together that he no sooner rises out of one than he is obliged to descend into another. They seldom contain water, but boulders are found at the bottom, on the sides, and on the surface around. In the prairie regions of southern Wisconsin, timber grows within the cavities, as well as on the adjacent surface, in clumps, known as oak orchards. The formation of such a system of depressions of so uniform a character, and over so large an extent of country, while the rocks beneath, wherever uncovered, are found polished and grooved, also indicates the movements and subsequent melting of large masses of ice. In various places there occur patches of boulders from among which the finer materials have been washed away. Near Twin Falls, on the Menomonee river, in Michigan, on the northern slope of a mountain, such a collection occurs nearly a mile across, covering the surface like a pavement with large masses smoothed and polished by attrition. Along the heights of land collections of boulders also frequently occur. After passing northward, above Lake Winnebago,

the portion of sand increases, and also the size and number of the boulders, which are mostly of igneous origin.

The second member of the glacier drift is not as readily made out as the other two. In general it is thin, passing into the first member above, and into the third below. Its characteristics are the finer condition of the material and more distinct stratification in the alternate layers of clay and sand. It is seen in its greatest development at the Grand Sable of Lake Superior, east of Grand island, where the coarse sand forms a stratum of from three to four hundred feet in thickness, overlying a thin stratum of clay. The prominent mountains and dunes along the eastern shore of Lake Michigan belong to this member of the drift formation.

The third member consists of the ash-colored, the red, and the blue laminated clays, the difference of color being probably caused by varying portions of oxide of iron. These strata are not, strictly speaking, formed of clay, but of finely comminuted sand, marl, and oxide of iron, with alumina enough to cause adhesion. On the summit of the land whence the streams flow northwardly into Hudson's bay, southerly into the gulf of Mexico, and southeasterly into Lake Superior, the three members of the drift period are conspicuously exhibited—the third occupying the lower level. On Lake Superior the lower member attains its greatest thickness. The rocks on which the glacial drift rests, wherever uncovered, exhibit markings and indications of scouring and striæ with variable distinctness, depending upon the capability of the rock to retain the impressions. In some cases the movement was parallel, or nearly so, to the strike of the strata, and in such instances sandstone beds have been carried away to a considerable depth, leaving long, narrow ridges of material better able to resist the grinding action. The general movement, as indicated by the striæ, was from the northeast to the southwest, the same as that observed in the northern part of Europe. In New England, markings of this kind on the rocks have been observed at 3,000 feet elevation, in Ohio at from 1,300 to 1,400 feet, and at Point Keewenaw, in Lake Superior, at from 1,400 to 1,600 feet. These elevations indicate the great thickness which the glacial ice must have attained. In various parts of the drift, boulders and nuggets of copper occur, which, in some cases, have been transported a long distance southward. Those found near Lake Superior, which have not been carried far from their origin, are of great size, and not as much rounded by attrition as those found at a greater distance. One of the former, from the clay on the west fork of the Ontonagon river, now in the

museum of the Smithsonian Institution, weighs 3,000 pounds, presenting angular points.

One of the characteristics which denotes the unity of the drift is the presence of wood, leaves and other vegetable matter. The imbedded timber is the same throughout the formation and is similar to that of the present growth of a more northern latitude, consisting of pine, spruce, willow, and white cedar, the latter being most abundant. At Cleveland, Ohio, the entire trunk of a white cedar, twenty feet in length, filled with proto-sulphide of iron, was found imbedded in the drift eighteen feet below the surface, and many wells in that city are rendered unfit for use by the layer of vegetation through which the water passes.

Animal remains, such as those of the elephant, mastodon, and horse are found in the same formation, in addition to various varieties of fresh-water shells.

Through the western country there are bluffs and terraces composed of solid rock, but besides these there are others composed of boulders, gravel, hard pan, clay, or sand. The former were the result of geological causes more ancient than the drift, while the latter are contemporaneous with this formation, and are probably due to parallel currents. What are commonly known as lake ridges, according to the author, are not ancient beaches, but the result of lateral currents distributing the drift. All the rivers and streams cut through these ridges and exhibit the drift clay frequently down to the rock below, while the beaches evidently belong to the alluvial period. Ancient lake ridges must not, therefore, be confounded with lake beaches. The distinctive feature of the latter is that they are narrow and steepest on the lake side, resembling terraces.

In the prairie region of Illinois, Wisconsin, Iowa, and Missouri the general surface is very uniform, but little elevated above the northern lakes. A rise of only twenty-six feet in Lake Michigan would turn its surplus waters across the summit into the Illinois river. Over a territory embracing Ohio, Indiana, Illinois, Iowa and part of Kentucky, Tennessee, Missouri, Wisconsin, Michigan, and Canada West, there are no considerable elevations. This space is an extended basin with a rolling surface, in which glacial action, unobstructed in its movement, would tend to produce but little change in the general topography, and therefore the position of valleys, rivers, and lakes is about the same at present as it was before the glacial period. The motion of the ice, however, must have removed a large portion of the broken fragments of the northern rocks to positions further south. The appearance would indicate that, as the glacial period

drew towards its close, the transporting material changed from one in which ice predominated to a modified one of ice and water.

Remarks are also made in this paper on the encroachment of the water upon the land, as indicating the slow but constant changes to which the surface of our earth is subjected. The clay bluffs of the lakes are continually worn away by the action of springs, rains, winds, and waves. They are attacked at the base, partially undermined, and finally precipitated into the water with the trees and whatever may be resting upon them. In due time they are spread over the bottom of the lake, forming new strata to be, perhaps, investigated by future geologists. Lakes Erie and Michigan, the shores of which are composed of drift clay, are filling up more rapidly than Lakes Huron and Superior, the coasts of which are more rocky.

Another phenomenon noticed is that of lines of boulders within and parallel to the shores of shallow lakes, presenting, in some cases, the appearance of a rude wall or fence of large stones. For example, in Mille lake, Minnesota, there are lines of this kind rising five and six feet above the water level, and formed of stones far too heavy to have been moved by the action of the waves. More than fifty years ago a similar appearance was described by President Dwight, of Yale College, as observed at Salisbury, Connecticut. The movement of the stones towards the shore was in this case clearly indicated by the troughs left in the bottom of the lake, visible in clear water. The phenomenon is now satisfactorily referred to the expansion of ice in which the boulders are imbedded in winter. This takes place in every direction from the centre of the lake outward, and is exerted in the case of ice of considerable thickness with almost irresistible energy. The stones are carried forward, and on the thawing of the ice are left in their new position.

The last section of the paper refers to examples of erosions, also referable to the movement of the ice of the glacial period. These are particularly exhibited in the great projection into Lake Superior from the southern shore called Point Keweenaw, in which are scooped out depressions, forming the basins of lakes, inlets, and harbors, exhibiting evidence of the direction and intensity of the transforming force, and it is probable that the shore line, and form of the bottom of the great lakes must have been modified by the action of the same cause. This work is illustrated by a map of North America, a profile of the deposits from Lake Erie to the Lake of the Woods, and eleven wood cuts.

Respectfully submitted,

JOSEPH HENRY,
Secretary Smithsonian Institution.

APPENDIX

TO THE

REPORT OF THE SECRETARY.

REPORT OF THE ASSISTANT SECRETARY, SPENCER F. BAIRD, RELATIVE TO
EXCHANGES, COLLECTIONS OF NATURAL HISTORY, ETC.

During the past year 763 principal packages have been received at the Institution by the various channels of transportation, and 768 sent out from it—being a considerable increase over the numbers of last year.

The principal statistics of the exchanges will be found in the following tables marked A, B, C, and D :

A.

Receipts of books, &c., by exchange in 1866.

Volumes :

Octavo	922
Quarto	226
Folio	95
	1, 243

Parts of volumes and pamphlets :

Octavo	3, 123
Quarto	1, 103
Folio	283
	4, 509

Maps and charts..... 121

Total.....

5, 873

The corresponding receipts for last year were 4,206, showing an increase of 1,667.

B.

Table showing the statistics of the exchanges of the Smithsonian Institution in 1866.

Agent and country.	Number of ad- dresses.	Number of pack- ages.	Number of boxes.	Bulk of boxes in cubic feet.	Weight of boxes in pounds.
DR. FELIX FLÜGEL, <i>Leipsic</i>—					
Sweden	11	21	.....	.....	.....
Norway	5	10	.....	.....	.....
Denmark	11	12	.....	.....	.....
Iceland	1	2	.....	.....	.....
Russia	44	49	.....	.....	.....
Germany	311	332	.....	.....	.....
Switzerland	33	38	.....	.....	.....
Special sending in May .....	.....	120	.....	.....	.....
Total	416	584	29	203	7, 550
FREDERICK MÜLLER, <i>Amsterdam</i>—					
Holland	45	53	.....	.....	.....
Belgium	11	14	.....	.....	.....
Total	56	67	5	35	1, 250
GUSTAVE BOSSANGE & Co., <i>Paris</i>—					
France	101	104	.....	.....	.....
Italy	59	61	.....	.....	.....
Spain	7	8	.....	.....	.....
Portugal	3	4	.....	.....	.....
Special sending in May .....	.....	40	.....	.....	.....
Total	80	217	15	105	3, 750
W. WESLEY, <i>London</i>—					
Great Britain and Ireland	186	207	.....	.....	.....
Australia	19	19	.....	.....	.....
Total	205	226	12	96	3, 006
Rest of the world	70	76	22	132	2, 800
Grand total	827	1, 170	83	571	18, 050

C.

Addressed packages received by the Smithsonian Institution from parties in America for foreign distribution in 1866.

	Number of packages.
<i>Albany, N. Y.</i>—	
Dudley Observatory	125
New York State Agricultural Society	72
New York State Homœopathic Society	10
Prof. James Hall	46
<i>Ann Arbor, Mich.</i>—	
Prof. A. Winchell	13

Boston, Mass.—

American Academy of Arts and Sciences	280
Board of State Charities	10
Boston Society of Natural History	231
J. J. Bowditch	1
Dr. B. A. Gould	46
Dr. S. G. Howe	1
Theodore Lyman	20

Buffalo, N. Y.—

G. W. Clinton	1
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Cambridge, Mass.—

Cambridge Observatory	101
Harvard College	20
Museum of Comparative Zoology	913
Nautical Almanac Office	52
Prof. H. J. Clark	25
Prof. Asa Gray	12

Chicago, Ill.—

Chicago Academy of Sciences	102
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Columbus, Ohio—

Ohio State Board of Agriculture	88
W. S. Sullivant	1

Dorchester, Mass.—

Dr. Edw. Jarvis	53
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Hillsboro', N. C.—

Dr. M. A. Curtis	1
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Iowa City, Iowa—

State University of Iowa	12
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Janesville, Wis.—

Institution for the Blind	125
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Lowell, Mass.—

J. R. Francis	17
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New Haven, Conn.—

American Journal of Science	27
American Oriental Society	5
Prof. J. D. Dana	48
Prof. E. Loomis	53

New York—

American Ethnological Society	6
New York Lyceum of Natural History	114
United States Sanitary Commission	400
Thomas Bland	25
A. A. Julien	9
Baron Ostensacken	1

Philadelphia, Penn.—

Academy of Natural Sciences	184
American Pharmaceutical Society	31
Dr. John L. LeConte	9
G. W. Tryon	53

Providence, R. I.—

State of Rhode Island.....	6
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Rock Island, Ill.—

B. D. Walsh.....	1
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San Francisco, Cal.—

Prof. W. P. Blake	15
Dr. Newcomb	50

St. Louis, Mo.—

Academy of Sciences.....	165
Dr. George Engelmann	30
Dr. B. F. Shumard.....	9
Dr. A. Wislizenus	90

Toronto, Canada—

Canadian Institute	5
Dr. C. J. Bethune.....	5

Washington, D. C.—

Census Bureau.....	4
Surgeon General United States army	392
Prof. Newcomb.....	85
Dr. Wetherill.....	25

Wilmington, Del.—

W. M. Canby	2
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4, 137

The preceding tables show a large increase over the numbers of 1865, there being a difference of 1,574.

D.

Addressed packages received by the Smithsonian Institution from Europe in 1866 for distribution in America.

	No. of packages.		No. of packages.
ALBANY, NEW YORK.		BRUNSWICK, MAINE.	
Albany Institute	3	Bowdoin College	8
Dudley Observatory	10	BURLINGTON, VERMONT.	
New York State Agricultural Society ..	19	University of Vermont	1
New York State Library	28	CAMBRIDGE, MASSACHUSETTS.	
New York State Medical Society	2	American Association for Advance-	
New York State University	2	ment of Science	27
State Cabinet of Natural History	1	Astronomical Journal	2
AMHERST, MASSACHUSETTS.		Harvard College	17
Amherst College	6	Museum of Comparative Zoology	8
ANNAPOLIS, MARYLAND.		National Academy of Sciences	22
United States Naval Academy	1	Observatory of Harvard College	14
ANN ARBOR, MICHIGAN.		Perkins' Institution for the Blind	1
Observatory	3	CHARLESTON, SOUTH CAROLINA.	
AUSTIN, TEXAS.		Astronomical Observatory	4
State Library	15	Elliott Society of Natural History	103
BALTIMORE, MARYLAND.		Society Library	13
Maryland Historical Society	2	South Carolina Historical Society	5
State Library	12	CHARLOTTESVILLE, VIRGINIA.	
BLACKWELL'S ISLAND, NEW YORK.		University of Virginia	19
New York City Lunatic Asylum	1	CHICAGO, ILLINOIS.	
BOSTON, MASSACHUSETTS.		Chicago Academy of Sciences	21
American Academy of Arts and Sci-		CINCINNATI, OHIO.	
ences	93	Astronomical Society	2
Christian Examiner	2	Dental Register	1
American Statistical Association	11	Mercantile Library Association	1
American Unitarian Association	3	Observatory	4
Boston Christian Register	3	COLUMBIA, MISSOURI.	
Boston Society of Natural History	197	Geological Survey of Missouri	9
Bowditch Library	1	COLUMBIA, SOUTH CAROLINA.	
Geological Survey of Massachusetts ..	1	South Carolina College	10
Historical Society of Massachusetts ..	2	State Library	10
New England Historico-Genealogical		COLUMBUS, OHIO.	
Society	2	Ohio State Board of Agriculture	58
North American Review	2	CONCORD, NEW HAMPSHIRE.	
Prison Discipline Society	2	New Hampshire Historical Society ..	2
Public Library	14	State Lunatic Asylum	1
State Library	6		
Technological Institute	1		
BRATTLEBORO', VERMONT.			
State Lunatic Asylum	1		

D.—*Addressed packages received by the Smithsonian Institution, &c.*—Contin'd.

	No. of packages.		No. of packages.
DES MOINES, IOWA.		JANESVILLE, WISCONSIN.	
State Library	23	Institution for Blind.....	1
DETROIT, MICHIGAN.		JEFFERSON CITY, MISSOURI.	
Michigan State Agricultural Society..	10	Historical Society of Missouri.....	1
FRANKFORT, KENTUCKY.		KINGSTON, JAMAICA.	
Geological Survey of Kentucky.....	7	Jamaica Society of Arts.....	1
GAMBIER, OHIO.		LEXINGTON, KENTUCKY.	
Kenyon College.....	1	Eastern Lunatic Asylum	1
GEORGETOWN, D. C.		LITTLE ROCK, ARKANSAS.	
Georgetown College	5	State Library	167
HALIFAX, NOVA SCOTIA.		State University	5
Nova Scotian Institute of Natural Sci- ences	1	LOUISVILLE, KENTUCKY.	
HAMPDEN SYDNEY, VIRGINIA.		University	5
Hampden Sydney College.....	1	MILLEDGEVILLE, GEORGIA.	
HANOVER, NEW HAMPSHIRE.		Oglethorpe University	19
Dartmouth College	9	State Library	13
HARRISBURG, PENNSYLVANIA.		MONTGOMERY, ALABAMA.	
State Library	1	State Library	15
State Lunatic Hospital.....	1	MONTPELIER, VERMONT.	
HARTFORD, CONNECTICUT.		State Library	8
Trinity College.....	4	MONTREAL, CANADA.	
Young Men's Institute.....	1	Geological Survey of Canada.....	1
HUDSON, OHIO.		Natural History Society.....	7
Western Reserve College.....	1	NASHVILLE, TENNESSEE.	
IOWA CITY, IOWA.		State Library	13
Iowa State University	27	State Lunatic Asylum.....	1
JACKSON, MISSISSIPPI.		NEW BRUNSWICK, NEW JERSEY.	
State Library	15	Geological Survey of New Bruns- wick	9
JACKSONVILLE, ILLINOIS.		NEW HAVEN, CONNECTICUT.	
Illinois State Lunatic Hospital.....	1	American Journal of Science and Arts	46
Institution for Blind	2	American Oriental Society.....	30
		Connecticut Academy of Sciences...	2
		Yale College	16

D.—*Addressed packages received by the Smithsonian Institution, &c*—Contin'd.

	No. of packages.		No. of packages.
NEW ORLEANS, LOUISIANA.		PROVIDENCE, RHODE ISLAND.	
New Orleans Academy of Sciences....	23	Brown University	6
		Secretary of State	1
NEW YORK, NEW YORK.		QUEBEC, CANADA.	
American Ethnological Society	5	Literary and Historical Society of	
American Geographical and Statistical		Quebec	2
Society	25		
American Institute	8	RALEIGH, NORTH CAROLINA.	
Astor Library	7	State Library	13
Austrian Consulate	1		
Columbia College	4	RICHMOND, VIRGINIA.	
Mercantile Library Association	2	Historical Society of Virginia	6
New York Academy of Medicine	3	State Library	2
New York Christian Inquirer	2		
New York Lyceum of Natural History ..	52	SACRAMENTO, CALIFORNIA.	
United States Sanitary Commission ..	1	State Library	1
University	3		
OLYMPIA, WASHINGTON TERRITORY.		ST. JOHN, NEW BRUNSWICK.	
State Library	1	Natural History Society	1
OMAHA, NEBRASKA.		ST. LOUIS, MISSOURI.	
State Library	1	Deutsches Institut zur Beförderung	
		der Wissenschaften	2
OXFORD, MISSISSIPPI.		St. Louis Academy of Sciences	92
University of Mississippi	1	University	3
PENFIELD, GEORGIA.		SALEM, MASSACHUSETTS.	
Mercer University	1	Essex Institute	11
PHILADELPHIA, PENNSYLVANIA.		SAN FRANCISCO, CALIFORNIA.	
Academy of Natural Sciences	131	California Academy of Natural Sci-	
American Journal of Conchology	1	ences	45
American Pharmaceutical Association ..	9	Geological Survey of California	1
American Philosophical Society	59		
Central High School	1	SAVANNAH, GEORGIA.	
Entomological Society	8	Georgia Historical Society	4
Franklin Institute	16		
Girard College	1	SPRINGFIELD, ILLINOIS.	
Historical Society of Pennsylvania ..	4	Illinois State Agricultural Society ...	1
Hospital for Insane	1		
Philadelphia Library Company	1	STAUNTON, VIRGINIA.	
Pennsylvania Horticultural Society ..	7	Western Lunatic Asylum	1
Pennsylvania Institution for Blind ...	1		
Wagner Free Institute	2	STOCKTON, CALIFORNIA.	
PORTLAND, MAINE.		California State Lunatic Hospital ...	1
Portland Society of Natural History ..	18		
PRINCETON, NEW JERSEY.			
Princeton College	5		

D.—*Addressed packages received by the Smithsonian Institution, &c.*—Contin'd.

	No. of packages.		No. of packages.
TAUNTON, MASSACHUSETTS.		WASHINGTON, D. C.—Continued.	
State Lunatic Asylum	1	Ordnance Bureau.....	2
TORONTO, CANADA.		Secretary of the Interior.....	1
Canadian Institute.....	11	Secretary of the Treasury	1
Observatory	1	Secretary of War.....	2
University College	2	Topographical Bureau	1
TUSCALOOSA, ALABAMA.		Treasury Department.....	8
University of Alabama	1	United States Coast Survey	16
UTICA, NEW YORK.		United States Naval Observatory....	72
American Journal of Insanity	2	United States Patent Office.....	136
New York State Lunatic Asylum.....	1	WATERVILLE, MAINE.	
WASHINGTON, D. C.		Waterville College.....	2
Bureau of Ordnance and Hydrography	2	WILLIAMSBURG, VIRGINIA.	
Census Bureau.....	3	Eastern Lunatic Asylum.....	5
Department of Agriculture	3	WINDSOR, NOVA SCOTIA.	
Library of Congress	3	King's College.....	4
Medical Department	32	WORCESTER, MASSACHUSETTS.	
Navy Department	2	American Antiquarian Society.....	6

Total addresses of institutions.....	169	
Total addresses of individuals.....	160	
		329
Total number of parcels to institutions.....	2,205	
Total number of parcels to individuals.....	498	
		2,703

ADDITIONS TO THE COLLECTIONS OF THE INSTITUTION IN 1866.

The total number of distinct donations in 1866 amounts to 220; the number of donors being 168. This exhibits a considerable increase over the figures of 1865, which are 155 and 102, respectively. The number of different packages received was 318, as compared with 257 of 1865.

The precise character of the collections received will be best gathered from the list of donations given further on. As will be seen they come from many different localities throughout the continent of America; the most important, however, being those from the officers of the Hudson's Bay Company, in Arctic America.

WORK DONE IN MUSEUM AND COLLECTIONS IN 1866.

Much labor has been expended during the year in cleaning the specimens on exhibition, and otherwise repairing the damage of the fire of 1865. The difficulty of preventing the rain and melted snow from coming through the temporary roof has caused great trouble from mould, requiring energetic measures of relief. No mounted specimens have been added to the collection.

As usual the collections received have been regularly entered and catalogued. The following table shows what has been done in this respect:

Table showing the entries in the record books of the Smithsonian Institution in 1865 and 1866.

Class.	1865.	1866.
Skeletons and skulls.....	6,609	7,100
Mammals.....	8,416	8,685
Birds.....	40,554	45,000
Reptiles.....	6,544	6,582
Fishes.....	5,588	5,591
Eggs of birds.....	9,939	10,400
Crustaceans.....	1,287	1,287
Mollusks.....	18,103	18,500
Radiates.....	2,725	2,725
Annelides.....	110	110
Fossils.....	5,907	5,920
Minerals.....	4,940	4,941
Ethnological specimens.....	1,125	2,260
Total.....	111,847	119,101

The comparison of the two columns shows that the number of entries during the year in the catalogues of specimens amounts to 7,254, about the usual annual average. Of birds alone the entries were nearly 4,500.

The following table exhibits the distribution of duplicate specimens in 1866, as compared with previous years:

Approximate table of distribution of duplicate specimens by the Smithsonian Institution to the end of 1866.

Class.	In 1865.		Total to end of 1865.		1866.		Total to end of 1866.	
	Species.	Specimens.	Species.	Specimens.	Species.	Specimens.	Species.	Specimens.
Osteology.....	1	1	64	64	40	40	104	104
Mammals.....	21	33	770	1,543	24	31	794	1,574
Birds.....	233	1,038	7,497	11,530	582	756	8,079	12,286
Reptiles.....	74	126	1,631	2,591	10	18	1,641	2,609
Fishes.....	750	1,200	2,393	5,149	1	1	2,394	5,150
Eggs of birds.....	893	2,421	3,603	9,162	96	217	3,699	9,379
Shells*.....	5,780	11,086	18,212	59,663	49,200	102,551	67,412	162,214
Radiates.....			551	727			551	727
Crustaceans.....			1,013	2,516			1,013	2,516
Marine invertebrates generally	200	550	1,800	5,060	38	92	1,838	5,152
Plants.....	10,000	12,975	10,000	12,975	3,058	5,328	13,058	18,303
Fossils.....	2,224	5,319	2,971	7,557			2,971	7,557
Minerals and rocks.....	250	600	1,321	5,554	25	25	1,346	5,579
Ethnology.....			58	58	92	92	150	150
Total distribution.....	20,426	35,349	51,884	124,149	53,166	109,151	105,050	233,300

* Of shells 390 sets were made up, and distributed to over 100 different institutions.

From the table it will be seen that the distribution of specimens in 1866 has amounted to nearly as much as in all previous years put together, the number of species being, indeed, greater. This is due to the extensive and final distribution of shells of the United States exploring expedition, &c.

The following assignment of Smithsonian materials for investigation or conservation has been made during the year 1866 :

Dr. H. Allen, Philadelphia.—Collections of cheiroptera, especially those gathered by Dr. Coues in Arizona.

S. A. Bailey, Utica.—Specimens of infusorial earths.

Thomas Bland, New York.—Collections of land shells, made by Mr. Charles Wright in Cuba, Mr. Strebel in Mexico, Mr. Stearns and Dr. Flint in Nicaragua.

Dr. T. M. Brewer, Boston.—Nests and eggs of American slender-billed oscine birds.

Dr. P. P. Carpenter, Montreal.—Collections of shells, made by Mr. John Xantus at Manzanillo, Messrs. W. H. Dall and Dr. C. A. Canfield at Monterey, California, James G. Swan in Puget sound, and various other west coast series.

John Cassin, Philadelphia.—Icteridæ of the general Smithsonian collection.

Prof. E. D. Cope, Philadelphia.—Reptiles collected by Mr. D. B. Parsons at Belize, Dr. A. Schott in Yucatan, Mr. Kennicott and others in Nicaragua, Prof. Sumichrast in Mexico, and Mr. A. E. Younglove in Hayti.

W. H. Edwards, Newburgh.—Lepidoptera, collected in Russian America, by the Russian telegraph expedition, by Drs. Coues and Palmer in Arizona, and Mr. Botteri and Prof. Sumichrast in Mexico.

Prof. Thomas Egleston—All the unlabelled boxes of minerals.

D. G. Elliot, New York.—Various species of North American birds, to be figured in his work.

Dr. G. H. Horn, Philadelphia.—Various exotic coleoptera.

Isaac Lea, Philadelphia.—Mexican and other unionidæ.

R. Ostensacken, New York.—Mexican diptera, collected by Mr. Botteri.

Edward Norton, Farmington, Conn.—Hymenoptera, collected in Mexico by Prof. Sumichrast.

Dr. Joseph Leidy, Philadelphia.—Various specimens of fossil mammal remains.

George N. Lawrence, New York.—Costa Rican and other birds.

Dr. John Torrey, New York.—Plants of western America, collected by Mr. Brydges, and other botanical specimens.

George W. Tryon, Philadelphia.—Melaniadæ of the United States and Mexico.

H. Ulke, Washington.—Coleoptera, collected by the Russian telegraph expedition.

ADDITIONS TO THE COLLECTIONS OF THE SMITHSONIAN INSTITUTION IN 1866.

Akhurst, John.—Skin of mouse, Brooklyn.

Aldrich, Mr.—Rattlesnake in alcohol, from Maryland.

Allen, C. M.—Series of birds breeding in Bermuda.

Ayres, Dr. W. O.—Types of California fishes.

Bannister, H.—(See *Bulkley*.)

Beadle, Rev. E. R.—Fossil echinoderms from desert of Sinai, and recent shells.

Bell, J. G.—Skins of South American birds.

Berendt, Dr. H.—Two boxes zoological collections from Belize.

Bland, Thomas.—Fifty species West Indian land shells.

Boardman, G. A.—Box of birds from New Brunswick.

Bode, Mrs.—Skins of South American birds.

Botteri, M.—Birds and mammals of Mexico.

Bradford, U. S. A., Dr. G. H.—Encrinite from New Mexico.

Brass, W.—Zoological collections from Fort Halkett.

Brevoort, J. C.—Specimen of *Tragulus* from Java; died in captivity.

Brigham & Mann, Messrs.—Series of Hawaiian plants.

- Bryan, O. N.*—Albino blackbird, and fossils from Prince George county, Md.
- Bryant, Dr. Henry*—Birds of Belize and Bahia
- Brydges, Mrs.*—Box of plants collected in Chile and Bolivia by Mr. Brydges.
- Bulkley, Co'onel C. S.*—Collections of Russian telegraph expedition, in various departments of natural history, made by Robert Kennicott, Dr. Fisher, Captain Sands, Captain Scammon, W. H. Dall, Henry Bannister, and J. F. Rothrock.
- Bulkley, Colonel C. S.*—Tusk of mammoth from Behring straits.
- Butcher, Dr. H. B.*—Collection of birds, &c., of the Lower Rio Grande, Texas.
- Canfield, Dr. C. A.*—Collection of birds, eggs, and marine invertebrates of California.
- Carmiol, J.*—Birds and butterflies of Costa Rica.
- Clarke, O.*—Silicious cinder from burning of wheat bran.
- Cleu, J. F.*—Large masses of rock salt, portions of tusks and teeth of fossil elephant, and pieces of cane-matting found below the elephant remains, at a depth of thirteen feet, and just above the salt. From Petit Anse island, Vermillion bay, Louisiana.
- Chicago Academy of Sciences.*—Specimens of *Amblystoma luridum*.
- Chute, R.*—Infusorial earth, St. Anthony's Falls.
- Collier, D. C.*—Chalk from a bluff seventy-five feet high, on the Smoky Hill river, Colorado.
- Collins, Colonel W. O.*—Skull and horns of *Cervus macrotis*, and dress of Indian chief, from Fort Laramie.
- Connolly, Henry.*—Skins and eggs of birds from Labrador.
- Cooper, Dr. J. G.*—*Hesperomys californicus*, and skin of hammer-head shark, from California; skull of Indian from Santa Catalina.
- Cooper, Juan.*—Skins of birds of Costa Rica.
- Copenhagen, Royal Zoological Museum.*—Nine specimens of skins of North European seals.
- Corse, Mr.*—Two bottles reptiles, Fort Tejon.
- Coues, U. S. A., Dr. S. E.*—Four hundred skins of birds, and other collections, from Arizona and California.
- Creamer, David.*—Lignite from near Baltimore.
- Curtis, Dr. M. A.*—Skins of *Sorex* and *Hesperomys*.
- Dall, W. H.*—Shells collected at Monterey, and types of *Helix chersonella*.
- Dall, W. H.*—(See *Bulkley*.)
- Darby, Dr. J. E.*—*Melaniadæ* from Tennessee river.
- Davis, Henry*—Fresh-water shells from Iowa.
- Dean, Henry C.*—Gray fox, (*Vulpes virginianus*,) in flesh.
- Dolbech, James.*—Gold-bearing quartz from Great Falls of Potomac.
- Dorman, O. M.*—Shells, Michigan.
- Dorr, R. R.*—Nest of *Geothlypis trichas* and insects.
- Dow, Captain J. M.*—Zoological specimens from Panama.
- Dow, Captain J. M.*—(See *Totten*.)
- Dresden, Royal Mineralogical Museum of.*—(Through Professor H. B. Geinitz.) two boxes of fossils and minerals.
- Ellsworth, Captain E. D.*—Piece of oak from the hull of Congress Galley, sunk in Lake Champlain, 1776, near town Pantton, Vermont.
- Engelmann, Dr. Geo.*—Head of surf duck: *Pelionetta perspicillata*.
- Fisher, Dr.*—(See *Bulkley*.)
- Flett, James*—Zoological collection from Fort Good Hope, Arctic America.
- Flint, Dr. Earl.*—Birds, shells, insects, and plants from Nicaragua.
- Foreman, Dr. Ed.*—Salamander from Maryland.
- Foster, Hon. L. F. S.*—Scalp of Navajo chief Ganado Blanco, from Fort Sumner, New Mexico.
- Frantzius, Dr. A. Von.*—Skin of birds of Costa Rica.

- Gatchell, Dr. H. T. F.—Dried toad from Kenosha, Wisconsin.
- Gaudet, Charles P.—Zoological collection from Peel's river, Arctic America.
- Geinitz, Professor H. B.—(See Dresden.)
- Gilpin, Dr.—Skin of *Sorex*; Halifax.
- Glover, Professor T.—Two mounted birds.
- Goss, B. F.—Skins of *Reithroden* and *Arvicola*, Kansas.
- Grayson, Colonel A. J.—Box of birds of Mazatlan.
- Grier, Colonel.—Scale of fish from Loess, near Vicksburg.
- Gruber, Ferd.—Box of birds of California, and egg of "Mexican wren."
- Gundlach, Dr. J.—*Caereba* and *Myiadestes* in alcohol, from Cuba.
- Gunn, Donald.—Zoological collections from lakes west of Lake Winnipeg.
- Haldeman, Professor S. S.—Three boxes of fossils invertebrata, and types of American fresh-water shells.
- Hardesty, W. L.—Ethnological and other collections from Fort Simpson.
- Harper, Professor L.—*Ceratites americanus*, from Alabama.
- Hawon, F.—Box of grasshoppers, Fort Leavenworth.
- Hayes, Dr. I. I.—Skin of walrus in salt.
- Hague, Henry.—Box of birds, San Geronemo, Guatemala.
- Heade, M. J.—Head of Savannah blackbird (*Crotophaga sulcirostris*), Virgin bay.
- Hepburn, Jas.—Birds of Nicaragua. Box of birds and eggs, California.
- Hill, M. S.—Specimens of 17-year locust, Ohio.
- Hubbard, Dr.—Specimens of *Helix blandii*, from Cherokee nation.
- Hubbard, Samuel.—Keg of alcoholic specimens, and nest of *Mygale*, from California.
- Ilges and Sauter.—Skins of South American birds.
- Jewett, Colonel E.—Ancient pottery, from Chiriqui.
- Jones, Strachan.—Zoological collection from Fort Yukon and Fort Rae.
- Kelsey, S. C.—Living spider from Nashville.
- Kennicott, Robert.—(See Bulkley.)
- Kluge, Dr.—Jar of crustacea from Aspinwall.
- Knudson, Valdemar.—Collection of birds from the Sandwich Islands.
- Krider, John.—Collection of mounted hawks.
- Latimer, George.—Pair of living *Loxigilla portoricensis* from Porto Rico.
- Lewis, M.—Pachnolite from Greenland.
- Little, Major T. E.—Skull and vertebral column of mink, (*Putorius vison*.)
- Lockhart, James.—Zoological collection from Great Slave lake.
- London, Royal College of Surgeons.—Two mounted sterna of birds.
- MacDonald, R.—Zoological collections from the Rocky mountains west of the Lower Mackenzie.
- McDowell, U. S. A., Major General.—(See Wallen.)
- MacFarlane, Robert.—Thirty-five boxes of zoological, ethnological and other collections from the Arctic coast of America, between the mouths of the Mackenzie and Coppermine rivers.
- McKee, U. S. A. Dr. J. R.—Skin of *Meleagris mexicana* from New Mexico.
- Magruder, Miss.—Large moth from Washington.
- Mann.—(See Brigham and Mann.)
- March, W. T.—Collection of birds and shells of Jamaica.
- Mayberry, Dr. E.—*Arvicola* and osteological specimens from Martha's Vineyard.
- Merrick, Mr.—Stone arrowheads from Long Island.
- Michener, Dr. E.—Sterna of birds.
- Neufchâtel Zoological Museum.—Twenty-seven species of birds, types of Tschudi, Fauna Peruane.
- Palmer, Dr. S.—Insects, plants, and fossils of Arizona.
- Parsons, D. B.—Series of turtles from Belize.

- Parsons, J. H.—Fossil shell from New York.
- Pease, U. S. A., Captain W. B.—Two specimens of *Sesia*, Texas.
- Philadelphia Academy of Natural Sciences.—Six mounted birds in exchange.
- Portland Natural History Society.—Series fresh-water and land shells of Maine.
- Potts, John.—Large living moth from Washington.
- Prentiss, Dr. D. W.—Skin and skeletons of birds.
- Pumpelly, R.—Two boxes of shells from China and Japan.
- Putnam, F. W.—*Gasterosteus Wheatlandii*, from Salem.
- Randall, F. A.—Five living *Menopoma Allegheniensis*.
- Reeves, Mr. and Mrs. Joel.—Eggs of birds from Calumet marshes, Illinois.
- Regenhofer, Dr.—(See Vienna.)
- Rhoads, J.—Collection of birds of Panama.
- Ridgway, A. E.—Monstrous chicken.
- Ridgway, Robert.—Box of nest and eggs of birds, Illinois.
- Ried, John.—Zoological collection from Great Slave lake.
- Riotte, C. N.—Antiquities from Costa Rica.
- Roome, J. H.—Porpoise skull and bird skins.
- Rothrock, J. T.—(See Bulkley.)
- Royall, Jos.—Marl from Vicksburg.
- Salazar, Governor.—Two boxes of zoological collections made by Dr. A. Shcott in Yucatan.
- Salem, Essex Institute.—Head of *Diomedea culminata*.
- Samuels, E. A.—Goshawk, (*Astur atricapillus*), in flesh.
- Sands, Captain —(See Bulkley.)
- Sauter.—(See Ilges.)
- Sartorius, Dr. Charles.—Zoological collections from the vicinity of Merador, Mexico.
- Sartorius, Florentin.—Collections of birds from near Merador, Mexico.
- Scammon, Captain.—(See Bulkley.)
- Schaufuss, L. W.—*Ætherea* from New Grenada, and four types of new coleoptera.
- Schee, Dr. H. M.—Box of shells, Iowa.
- Schott, Dr. A.—(See Salazar.)
- Schwartz, W. F.—Birds and eggs, California.
- Sclater, Dr. P. L.—Skin of *Peucea boucardi*.
- Shaffer, D. H.—Box of living ferns.
- Sharp, U. S. A., Dr. Redford.—Specimens of reptiles, insects, &c., in alcohol, from Texas.
- Sibbiston, James.—Zoological collections from Fort Youkon.
- Siler, A. L.—Skin of *Centia rubrizona*, Utah.
- Skidmore, M.—Heads of ducks.
- Slagle, M.—Box of eggs of birds.
- Smith, Donald A.—Five skins of Labrador birds.
- Smith, W.—Living horned owl, (*Bubo virginianus*.)
- Stearns, R. E. C.—Shells from Nicaragua, California, and South America.
- Steindachner, Dr. F.—(See Vienna.)
- Stickney, Mr.—Starch made in Florida from seeds of coontee, (*Zamia integrifolia*.)
- Strebel, Dr. M.—Box of shells, Vera Cruz.
- Sumichrast, Professor F.—Birds, mammals, and alcoholic specimens of Mexico.
- Swan, J. G.—Indian curiosities and zoological specimens from Puget sound.
- Tiffany, Rev. C. C.—Bottle reptiles, Arabian desert.
- Totten, Dr. G. F.—Skeleton of *Procyon cancrivora*, Aspinwall.
- Totten, Dr. G. F., through Captain J. M. Dow.—Skeleton of *Elasmognathus Bairdii* from Panama railroad.

Vienna Zoological Museum, through Dr. Regenhofer.—Series of Austrian Lepidoptera.

Vienna Zoological Museum, through Dr. F. Steindachner.—Series of European fishes in alcohol.

Vuille, W.—Skins and eggs of birds of California.

Wallen, U. S. A., Colonel H. D.—Skin of *Heloderma horridum*, Arizona ; received through Major General Irvin McDowell.

Wallis, J. Willie—Skin of albino swallow, from Bladensburg.

Warren, General G. K.—Mounted head of Elk.

Watt, D. A.—Fishes from St. Lawrence river.

Weeds, U. S. A., Dr. James F.—Living horned frog (*Phrynosoma orbiculare*,) New Mexico.

Wernigk, Dr.—Zoological collections, Colorado and Montana.

Woltz, T. N.—Eggs of pigeons.

Woodward, R. B.—Mounted birds of California.

Wright, Charles.—Shells and insects of Cuba

Young, John F.—*Remora*, or sucking fish, from Potomac river.

Younglove, A. E.—Box of birds and reptiles, Hayti.

Zeledon, A.—Skins of birds of Costa Rica.

LIST

OF

METEOROLOGICAL STATIONS AND OBSERVERS OF THE SMITHSONIAN INSTITUTION FOR THE YEAR 1866.

BRITISH AMERICA.

Name of observer.	Station.	North latitude.	West longitude.	Height.	Instruments.*	No. of months received.
		° '	° '	Feet.		
Acadia College	Wolfville, Nova Scotia.....	45 06	64 25	80	A.....	11
Connolly, Henry.....	Winowkupa, Labrador				B. T.....	6
Magnetic Observatory.....	Toronto, Canada West.....	43 39	79 21	†108	A.....	6
Murdock, G.....	St. John, New Brunswick.....	45 16	66 03	135	A.....	12
O'Donoghue, John.....	St. Anne, Canada East	47 24	70 05	175	B. P. T.	2
Rankin, Colin	Michipicoton, Canada West	47 56	85 06	660	B. T.....	5

MEXICO.

Sartorius, Dr. Charles	Mirador, Vera Cruz.....	19 15	96 25	3,600	A.....	12
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CENTRAL AMERICA.

Frantzius, Dr. A.....	San José, Costa Rica.....	9 54	84 06	3,772	A.....	1
Riotte, C. N.....	San José, Costa Rica.....	9 54	84 06	3,772	T. R.....	11
Klugé, J. P., M. D.....	Aspinwall	9 23	79 53	6	A.....	11

BERMUDA.

Royal Engineers, (in the Royal Gazette.)	Centre Signal Station, St. George's.....				A.....	12
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* A signifies Barometer, Thermometer, Psychrometer, and Rain Gauge. B signifies Barometer. T signifies Thermometer. P signifies Psychrometer. R signifies Rain Gauge. N signifies no instrument.
† Above Lake Ontario.

List of meteorological stations and observers, &c.—Continued.

ALABAMA.

Name of observer.	Station.	County.	North latitude.	West longitude.	Height.	Instruments.	No. of months received.
			° '	° '	Feet.		
Cornette, A., S. J.....	Spring Hill	Mobile	30 41	88 09	157	T. R	1
Harris, Andrew J.....	Moulton	Lawrence	34 32	87 25	643	A	5
Peters, Thomas M.....	Moulton	Lawrence	34 36	87 25	643	B. T. R..	4
Vankirk, W. J.....	Bon Secour.	Baldwin.....				T	3
Tutwiler, H.	Havana	Greene.....	32 50	87 46	500	T. R....	7

ARKANSAS.

Russell, O. F.....	Helena.....	Phillipps	34 33	90 10	.....	T. R	12
Springer, Rev. Francis....	Fort Smith .....	.....	.....	.....	.....	T	1

CALIFORNIA.

Ayres, W. O., M. D.....	San Francisco ...	San Francisco...	37 48	122 27	30	A	12
Canfield, Colb't A., M. D..	Monterey.....	Monterey	36 36	121 52	40	A	12
Logan, Thomas M., M. D.	Sacramento	Sacramento	38 32	121 30	65	A	12
Smith, Mrs. M. D	Meadow Valley..	Plumas	40 20	120 15	3,700	B. T. R..	9

COLORADO.

Merriam, Arthur M.....	Fontaine	El Paso				N	2
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CONNECTICUT.

Dewhurst, Rev. E.....	Groton	New London	41 21	72 12	20	B. T. R..	12
Hunt, Rev. Daniel	Pomfret	Windham	41 52	72 10	587	A	12
Johnston, Prof. John.....	Middletown	Middlesex	41 33	72 39	175	A	12
Rockwell, Charlotte.....	Colebrook	Litchfield	42 00	73 03	.....	T	12
Yeomans, William H.....	Columbia	Tolland	41 40	72 42		T	12

DELAWARE.

Vankeele, L.....	Delaware City...	New Castle.....	39 35	75 34		T	4
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FLORIDA.

Baldwin, A. S., M. D.....	Jacksonville.....	Duval.....	30 15	82 00	20	A	4
Garvin, P. C., M. D.....	Gordon	Alachua	29 45	82 30		T	4
Ives, Edward R.....	Lake City	Columbia	30 12	82 40	185	T. R	3
Scott, H. B.....	Gordon.....	Alachua	29 45	82 30		T	2

GEORGIA.

Deckner, Fredrick	Atlanta	Fulton	33 45	84 31	1,050	T. R	11
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List of meteorological stations and observers, &c —Continued.

ILLINOIS.

Name of observer.	Station.	County.	North latitude.	West longitude.	Height.	Instruments.	No. of months received.
			° ' "	° ' "	Feet.		
Adams, W. H.	Elmore	Peoria	40 56	90 04	612	R	11
Aldrich, Verry	Tiskilwa	Bureau	41 15	89 16	550	T	12
Babcock, E.	Riley	McHenry	42 11	88 33	760	T. R	11
Bowman, E. H., M. D.	Andalusia	Rock Island	41 30			B. T	11
Ballou, N. E., M. D.	Sandwich	DeKalb	41 31	88 30	665	T. R	12
Brendel, Frederick, M. D.	Peoria	Peoria	40 43	89 30	460	A	12
Blanchard, O. A.	Elmira	Stark	41 12	90 15		T. R	12
Brinkerhoff, George M.	Springfield	Sangamon	39 48	89 33		T	12
Brookes, Samuel	Chicago	Cook	42 00	87 30	600	T	12
Carey, Daniel	Alto	Lee	41 45	89 00		T	5
Dudley, Timothy	Waverly	Morgan	39 40	90 00	680	T. R	12
Duncan, Rev. Alexander	Mount Sterling	Brown	40 00	91 15		T	12
Eldredge, William V.	Golconda	Pope	37 41	88 47		T	11
Grant, John	Manchester	Scott	39 31	90 34	683	A	11
Grant, Charles W.							
Huse, Fred. J.	Evanston	Cook	42 03	87 38	614	B. T	1
Livingston, Prof. William	Galesburg	Knox	40 55	87 11	795	A	12
Marcy, Prof. Oliver	Evanston	Cook	42 03	87 38	614	B. T. R.	1
Marsh, O. J.	Hoylton	Washington	38 30	89 00		T	3
Mead, S. B.	Augusta	Hancock	40 10	91 00		T. P. R.	12
Merwin, Mrs. Emily H.	Ottawa	La Salle	41 20	88 47	500	T. R	11
Moore, C. H.	Clinton	De Witt	40 09	88 58	430	B. T	4
Parker, John D.	De Kalb	De Kalb				B	2
Phelps, E. S.	Wyanet	Bureau	41 30	89 45		T. R	12
Phelps, Miss Lelia E.							
Pool, Isaac A.	Chicago	Cook				T	1
Rogers, O. P. and J. S.	Marengo	McHenry	42 14	88 38	842	B. T. R.	7
Smith, Henry K.	Magnolia	Putnam	41 15	89 15		T. R	2
Spencer, Wm. C.	Dubois	Washington	38 14	89 16		T. R	12
Spaulding, Abiram	Aurora	Kane	41 48	88 23		A	12
Spaulding, S. C.	South Pass	Union				T	2
Tolman, James W.	Winnebago	Winnebago	42 17	89 12	900	A	12

INDIANA.

Boerner, Charles G.	Vevay	Switzerland	38 46	84 59		T. R	12
Butterfield, W. W. & Mrs.	Indianapolis	Marion	39 45	86 20	698	T	8
Chappellsmith, John	New Harmony	Posey	38 08	87 50	350	A	12
Collins, Rev. Samuel	Madison	Jefferson	38 45	85 40	400	B. T. R.	5
Dawson, William	Spiceland	Henry	39 48	85 18	1,025	B. T. R.	12
Griest, Miriam	Balbec	Jay	41 00	85 00	1,000	B. T	4
Holmes, Thomas	Merom	Sullivan	39 10	87 40		T. R	4
Kemper, G. W. H., M. D.	Muncie	Delaware	40 12	85 16		T. R	5
McCoy, Dr. F.	Columbia	Whitney	41 10	85 30		T. R	12
McCoy, Miss Lizzie.							
Sutton, George, M. D.	Aurora	Dearborn	39 04	84 54	*80	B. T. R.	12
Valentine, John	Richmond	Wayne	39 52	84 39	850	A	12

IOWA.

Bryant, A. F.	Fontanelle	Adair	41 30	95 35	1,500	T. R	8
Bush, Rev. Alva	Osage	Mitchell	43 20	83 00		T	9
Collin, Prof. Alonzo	Mount Vernon	Linn	42 00	91 00		T	12
Deering, D. S.	Independence	Buchanan	42 30	92 16	850	T	12
Dickinson, James P.	Guttenburg	Clayton	43 00	90 50	690	T	7
Dorweiler, Philip	Guttenburg	Clayton	43 00	90 50	690	T	3
	Algona	Kossuth					
Farnsworth, P. J., M. D.	Clinton	Clinton	40 40	90 10	630	T. R	12
Hagensick, John Mathias	Ceres	Clayton	42 45	91 11	825	T	12
Horr, Asa, M. D.	Dubuque	Dubuque	42 30	90 40	666	A	12
Hudson, A. T.	Lyons	Clinton	40 42	90 10	630	T. R	7
Kridelbaugh, S. H., M. D.	Clarinda	Page				T. R	1
Love, Louisa P.	Burlington	Des Moines	40 53	91 10	530	T	2
McCready, Daniel	Fort Madison	Lee	40 37	91 28		T. R	12

* Above low water in Ohio river.

List of meteorological stations and observers, &c.—Continued.

IOWA—Continued.

Name of observer.	Station.	County.	North latitude.	West longitude.	Height.	Instruments.	No. of months received.
			° '	° '	Feet.		
Massman, Dr. J.....	Lyons.....	Clinton.....	40 42	90 10	.....	T. R.....	3
Mead, Allen.....	Manchester.....	Delaware.....	42 30	91 30	925	T. R.....	12
Mead, Chauncey.....	Monticello.....	Jones.....	42 15	91 15	880	T. R.....	6
Moulton, M. M.....	Monticello.....	Jones.....	42 15	91 15	800	T. R.....	6
Nash, Rev. J. A.....	Des Moines.....	Polk.....	41 35	93 36	.....	T. R.....	12
Parvin, Prof. Theodore S.	Iowa City.....	Johnson.....	41 37	.....	621	A.....	12
Pratt, George B.....	Davenport.....	Scott.....	41 30	90 40	737	A.....	12
Smith, Sydney.....							
Steed, T.....	Waterloo.....	Black Hawk.....	42 30	92 30	670	T.....	12
Stern, Jacob T.....	Harris Grove.....	Harrison.....	41 00	95 00	900	T.....	6
Taylor, Prof. K. M., M. D.	Keokuk.....	Lee.....	40 27	91 36	.....	A.....	2
Townsend, Nathan.....	Iowa Falls.....	Hardin.....	42 32	93 20	.....	T. R.....	11
Walton, Josiah P.....	Muscatine.....	Muscatine.....	41 25	92 02	582	A.....	6
Wheaton, Alex. Camp.....	Independence.....	Buchanan.....	42 29	91 50	.....	T. R.....	2
Wheaton, Mrs. Daniel D..	Independence.....	Buchanan.....	42 29	91 50	.....	T. R.....	10

KANSAS.

Agricultural College.....	Manhattan.....	Riley.....	39 12	96 45	1,000	T. R.....	8
Bacon, David G.....	Lecompton.....	Dougllass.....	.....	.....	.....	R.....	4
Beckwith, W.....	Olatha.....	Johnson.....	38 50	94 30	.....	T. R.....	12
Crocker, Allen.....	Avon.....	Coffey.....	38 08	95 35	825	T. R.....	3
Horn, Dr. H. B., and Miss Clotilde.	Atchison.....	Atchison.....	39 42	95 00	.....	T.....	7
Shaffer, Joseph M.....	Fort Riley.....	Davis.....	39 00	96 30	1,300	T.....	2
Camp, Essex P.....							
Stayman, Dr. J.....	Leavenworth.....	Leavenworth.....	39 15	94 52	.....	T. R.....	12
Woodworth, Abner, M. D.	Council Grove.....	.....	38 42	96 32	.....	T. R.....	12

KENTUCKY.

Beatty, O.....	Danville.....	Boyle.....	37 40	84 30	900	B. T. R..	12
Doak, W. S.....	London.....	Laurel.....	37 12	84 03	.....	T.....	3
Martin, Dr. Samuel D....	Chilesburg.....	Fayette.....	38 04	84 20	900	B. T. R..	11
Young, Mrs. Lawrence....	Louisville.....	Jefferson.....	38 07	85 24	570	A.....	12
Mathis, H. C.....	Taylorsville.....	Spencer.....	38 00	85 00	600?	T. R.....	4

MAINE.

Gardiner, Robert H.....	Gardiner.....	Kennebec.....	44 11	69 46	76	A.....	12
Guptill, G. W.....	Cornish.....	York.....	43 40	70 44	800	T. R.....	12
Moore, Asa P.....	Lisbon.....	Androscoggin.....	44 00	70 04	130	T. R.....	12
Moulton, John P.....	Standish.....	Cumberland.....	43 45	70 30	280	T. R.....	8
Parker, J. D.....	Steuben.....	Washington.....	44 31	67 57	50	A.....	11
Pettingill, Waldo.....	Rumford Point.....	Oxford.....	44 30	70 40	600	T. R.....	3
Pitman, Edwin.....	Lee.....	Penobscot.....	.....	.....	.....	T.....	3
	Williamsburg.....	Piscataquis.....	45 21	.....	.....	T. R.....	6
Robinson, Almon.....	Webster.....	Androscoggin.....	44 04	70 04	.....	T.....	1
Towle, Benjamin H.....	Lee.....	Penobscot.....	.....	.....	.....	T. R.....	7
West, Silas.....	Cornish.....	York.....	43 40	70 44	784	B. T. R..	12
Wilbur, Benjamin F.....	West Waterville.....	Kennebec.....	44 30	69 45	250	T. R.....	12

MARYLAND.

Baer, Miss Harriott M....	Frederick.....	Frederick.....	39 24	77 17	.....	T. R.....	9
Goodman, William R.....	Annapolis.....	Anne Arundel...	38 58	76 29	20	A.....	12
Grape, George S.....	Catonsville.....	Baltimore.....	39 17	76 42	42	T.....	12
McCormick, James O.....	Woodlawn.....	Cecil.....	39 39	76 04	.....	B. T. R..	12
Smith, Eli.....	Emmitsburg.....	Frederick.....	.....	.....	.....	T.....	6
Stephenson, Rev. James..	St. Inigoes.....	St. Mary's.....	38 10	76 30	45	A.....	4

List of meteorological stations and observers, &c.—Continued.

MASSACHUSETTS.

Name of observer.	Station.	County.	North latitude.	West longitude.	Height.	Instruments.	No. of months received.
			° '	° '	Feet.		
Astronomical Observatory.	Williamstown . . .	Berkshire	42 43	73 13	686	A	12
Bacon, William	Richmond	Berkshire	42 13	72 20	1,000	T. R	11
Caldwell, John H	Newbury	Essex	42 45	70 55	25	T	12
Cunningham, George A . . .	Lunenburg	Worcester	42 35	71 43	.....	B. T	5
Davis, Rev. Dr. Emerson.	Westfield	Hampden	42 06	72 48	180	A	5
Draper, Joseph	Worcester	Worcester	42 16	71 48	528	A	12
Fallon, John	Lawrence	Essex	42 42	71 11	133	A	12
Fendler, Augustus	Cambridge	Middlesex	42 28	71 11	60	B. T	2
Merriam, Arthur M	Topsfield	Essex	42 38	71 57	.....	A	3
Merriam, Sidney A	Topsfield	Essex	42 38	71 57	.....	A	9
Metcalf, John Geo.	Mendon	Worcester	42 06	71 34	.....	B. T. R . . .	12
Nason, Rev. Elias	North Billerica	Middlesex	42 34	71 16	.....	B. T	11
Nelson, Henry M	Georgetown	Essex	42 42	71 00	225	T	8
Newcomb, Guilford S	Kingston	Plymouth	42 00	70 45	.....	T. R	6
Rodman, Samuel	New Bedford	Bristol	41 39	70 56	90	A	12
Snell, Prof. E. S	Amherst	Hampshire	42 22	72 34	267	A	12
Tucker, Edward T	New Bedford	Bristol	41 39	70 55	50	T. R	4

MICHIGAN.

Bullard, R	Litchfield	Hillsdale	42 01	84 46	1,040	T. R	7
Chase, Milton, M. D	Kalamazoo	Kalamazoo . . . . .	.....	.....	.....	T	4
Ellis, Edwin, M. D	Ontonagon	Ontonagon	46 40	90 00	610	T	7
Holmes, E. S	Grand Rapids	Kent	43 00	85 40	752	T	9
Kedzie, Prof. R. C	Lansing	Ingham	42 42	84 34	895	A	12
Mapes, Henry H	Oshtemo	Kalamazoo . . . . .	.....	.....	.....	N	12
Minick, J. B	Houghton	Houghton	46 40	88 30	600	T. R	1
Paxton, J. W	Alpena	Alpena	45 02	83 05	.....	B. T	6
Smith, Rev. Geo. N	Northport	Leelanau	45 08	85 41	592	T	7
Smith, Harmon M	Kalamazoo	Kalamazoo	42 20	85 40	.....	N	11
Steele, George E	Homestead	Benzie	44 30	86 00	.....	T	11
Strong, L. H	Holland	Ottawa	42 42	86 00	.....	T. R	10
Whelpley, Miss Florence E.	Monroe	Monroe	41 58	83 23	590	T. R	12

MINNESOTA.

Babcock, Dr. B. F	Afton	Washington	44 50	93 00	950	T	9
Cheney, William	Minneapolis	Hennepin	45 00	93 10	856	A	12
Heimstreet, John W	St. Paul	Ramsey	44 57	93 05	800	A	3
Paterson, Rev. A. B., D.D . .	St. Paul	Ramsey	44 57	93 05	800	T. R	12
Roos, Charles	New Ulm	Brown	44 16	94 26	*821	T. R	12
Smith, Henry L	Forest City	Meeker	45 13	94 28	.....	T. R	5
Stouffer, Andrew	Bowles's Creek	Washington	44 56	92 52	800	T	1
Wieland, C	Beaver Bay	Lake	47 12	91 18	650	T. R	12
Woodbury, C. W	Sibley	Sibley	44 31	94 26	1,600	T. R	11

MISSISSIPPI.

Cleland, Rev. T. H	Fayette	Jefferson . . . . .	.....	.....	.....	T	2
McCary, Robert	Natchez	Adams	31 34	91 25	.....	B. T. R . . .	7
McCary, William	Natchez	Adams	31 34	91 25	2	B. T. R . . .	5
Moore, Albert	Grenada	Yallobusha	33 45	90 00	.....	T	11
Smith, J. Edwards	Kingston	Adams	31 24	91 16	.....	B. T	4

MISSOURI.

Caldwell, Joseph T	Athens	Clark . . . . .	.....	.....	.....	T. R	6
Christian, John	Harrisonville	Cass	38 40	94 30	.....	T. R	12
Englemann, George, M. D . .	St. Louis	St. Louis	38 37	90 15	481	A	11
Fendler, Augustus	Allenton	St. Louis	38 29	90 45	482	B. T. P . . .	10
Moore, Dr. W	Union	Franklin	38 25	91 09	616	T. R	11
Ray, George P	Canton	Lewis	40 12	91 37	.....	T	7
Sibley, P. B	Easton	Buchanan	39 46	94 22	.....	T. R	7
Stuntebeck, F. H., S. J . . .	St. Louis	St. Louis	38 37	90 15	470	A	12
Vertrees, John E	Edinburg	Grundy	40 00	93 30	.....	T. R	4

* Above Minnesota river.

List of meteorological stations and observers, &c.—Continued.

MONTANA.

Name of observer.	Station.	County.	North latitude.	West longitude.	Height.	Instruments.	No. of months received.
Wheaton, Alex. Camp....	Helena City	Edgerton	46 45	111 50	Feet. 4, 150	T	12

NEBRASKA.

Bowen, John S	Elkhorn City....	Washington	41 22	96 12	1, 350	T	12
Child, A. L., M. D.....	Glendale	Cass	40 55	96 05	1, 010	T	11
Hamilton, Rev. William ..	Bellevue	Sarpy	41 08	95 50	.....	T. R	12

NEW HAMPSHIRE.

Brown, Branch.....	Stratford	Coos	44 04	71 07	1, 000	T. R	12
Chase, Arthur.....	Claremont	Sullivan.....	43 22	72 21	539	B. T. R..	12
Hurlin, Rev. Wm	Antrim	Hillsboro' .....	.....	.....	.....	N	1
Mead, Stephen O.....	Claremont	Sullivan.....	.....	.....	.....	T	11
Odell, Fletcher.....	Shelburne	Coos	44 23	71 06	700	B. T	12
Pitman, Charles H	North Barnstead.	Belknap.....	43 38	71 27	.....	T. R	10
Wheeler, John T.....	Concord	Merrimack	43 12	71 29	400	B. T. R..	9

NEW JERSEY.

Beans, Thomas J.....	Moorestown	Burlington	39 59	74 54	.....	T. R	12
Brooks, William	Paterson	Passaic	40 55	74 10	60	T. R	12
Cole, Barker	Seaville	Cape May.....	39 20	74 40	18	T	5
Cook, Ephraim R.....	Trenton	Mercer .....	.....	.....	.....	B. T. R..	12
Cook, Prof. George H....	New Brunswick.	Middlesex	40 30	74 27	80	A	12
Deacon, John C.....	Burlington	Burlington	40 05	75 10	60	T. R	12
Fleming, John	Readington	Hunterdon	40 33	74 40	.....	T	2
Lippincott, James S.....	Cole's Landing ..	Camden	39 54	75 02	50	A	5
Rhees, Morgan J., M. D..	Mount Holly	Burlington	40 00	74 47	30	B. T	12
Sheppard, Clarkson.....	Greenwich	Cumberland ..	39 20	75 25	30	A	12
Sheppard, Miss R. C. ...							
Shriver, Howard	Dover	Morris .....	.....	.....	.....	B. P. T.	4
Whitehead, W. A.....	Newark	Essex	40 45	74 10	35	B. T. R..	12
Wood, Samuel.....	Haddonfield	Camden .....	.....	.....	.....	A	7

NEW YORK.

Arden, Thomas B.....	Garrison's	Putnam	41 22	74 02	180	T. R	12
Aubier, Rev. Jno. M., S. J.	New York	New York.....	40 44	73 59	104	B. T	4
Barrows, Storrs.....	South Trenton ..	Oneida	43 10	74 56	835	T. R	12
Bartlett, Erastus B.....	Vermillion	Oswego	43 26	77 26	327	T. R	12
Beauchamp, William M....	Skaneateles	Onondaga	43 00	76 30	932	B. T	12
Bowman, John.....	Baldwinsville ..	Onondaga	43 04	76 41	.....	T	12
Denning, William H.....	Fishkill on Huds'n	Dutchess	41 34	74 18	42	B. T. R..	10
Dewey, Prof. Chester	Rochester	Monroe.....	43 07	77 51	516	B. T. R..	12
Edwards, Daniel.....	Little Genesee...	Allegany	42 00	78 36	1, 500	B. T. R..	11
Fries, George W.....	Friendship	Allegany	42 15	78 10	1, 536	T	2
Gardiner, James H.....	Newburg	Orange	41 31	74 01	85	B. T. R..	12
Gregory, S. O.....	Theresa	Jefferson	44 12	75 48	365	T. R	11
Haas, Henry	Depauville	Jefferson	44 15	.....	350	T. R	12
Heimstreet, John W.....	Troy	Rensselaer.....	42 44	73 40	58	A	5
Howell, Robert	Nichols	Toga	42 00	76 32	.....	T	12
Ingalsbe, Grenville M....	South Hartford ..	Washington	43 15	73 21	400	T. R	12
Ives, William	Buffalo	Erie .....	.....	.....	.....	B. T. R..	12
Joy, Prof. Charles A.....	New York	New York	40 43	74 05	.....	A	12
Mack, Rev. Eli T.....	Flaibush	Kings	40 37	74 02	54	B. T. R..	10
McMore, P. A.....	Fort Ann	Washington	42 03	73 44	1, 430	T. R	2
Malcom, Wm. Schuyler ..	Oswego	Oswego	43 28	76 30	250	B. T. R..	12
Mathews, M. M., M. D....	Rochester	Monroe.....	43 08	77 51	525	A	12
Morris, Miss Elizabeth....	Throg's Neck.....	Westchester ..	40 49	73 49	43	T	12

List of meteorological stations and observers, &c.—Continued.

NEW YORK—Continued.

Name of observer.	Station.	County.	North latitude.	West longitude.	Height.	Instruments.	No. of months received.
			° '	° '	Feet.		
Morris, Prof. Oran W.	New York	New York	40 43	74 05	75	A	11
Paine, Horace M., M. D. .	Albany	Albany	42 39	73 44	75	P. T. R	4
Roe, Sanford W. {	Jamestown	Chautauqua	42 06	79 29	1,454	T	3
	Germantown	Columbia				T	9
Rogers, F. M.	Throg's Neck	Westchester				T. R.	2
Russell, Cyrus H.	Gouverneur	St. Lawrence	44 19	75 29		B. T. R.	11
Smith, E. A., & daughters.	Moriches	Suffolk	40 49	72 36	13	T. R.	12
Spooner, Stillman, M. D. .	Oneida	Madison	43 04	75 50	500	T. R.	12
Trowbridge, David.	Hector	Schuyler	42 30	77 00	850	N	12
Willis, Oliver R.	White Plains	Westchester	41 05	73 40		T	9
Wilson, Rev. W. D., D. D.	Geneva	Ontario	42 53	77 02	567	B. T. R.	12
Wooster, Charles A.	North Hammond.	St. Lawrence	44 30	75 40		B. T. R.	7
Yale, Walter D.	Houseville	Lewis	43 40	75 32		T. R.	6

NORTH CAROLINA.

Adams, E. W.	Wilson	Wilson	35 41	77 47	105	T. R.	11
Allison, Thos. A.	Statesville	Iredell				T. R.	7
Brewer, Rev. Fisk P.	Raleigh	Wake				T. R.	5
Mills, John H.	Oxford	Granville	36 23	78 14		T	6

OHIO.

Abell, B. F.	Welshfield	Geauga	41 23	81 12	1,205	T. R.	3
Bambach, Dr. G.	Ripley	Brown	38 47	83 31	*106	A	7
Benner, Josiah F.	New Lisbon	Columbiana	40 45	80 45	961	B. T. R.	12
Clarke, John	Bowling Green ..	Wood				T. R.	11
Crane, George W.	Bethel	Clermont	39 00	84 00	555	T. R.	12
Doyle, J. B.	Steubenville	Jefferson	40 45	80 47		B. T.	12
Fraser, James B.	Saybrook	Ashtabula	41 48	80 53		T	4
Hammitt, John W.	College Hill	Hamilton	39 19	84 26	800	T. R.	10
Harper, George W.	Cincinnati	Hamilton	39 06	84 27	*305	A	12
Haywood, Prof. John	Kingston	Ross	39 29	83 00	692	A	12
Huntington, George C.	Kelley's Island ..	Erie	41 36	82 42	587	B. T. R.	12
Hyde, Gustavus A. {	Cleveland	Cuyahoga	41 30	81 38	683	B. T. R.	12
Hyde, Mrs.							
McMillan, Smith B.	East Fairfield	Columbiana	40 41	80 44	1,152	A	12
Mathews, Joseph McD.	Hillsborough	Highland	39 13			A	12
Myers, John H.	Smithville	Wayne	40 52	81 51	934	T	2
Newton, Rev. Alfred	Norwalk	Huron	41 13	82 43		T. R.	10
Phillips, R. C.	Cincinnati	Hamilton	39 06	84 27	588	B. T. R.	12
Rodgers, A. P.	Gallipolis	Gallia	39 00	82 00	600	T. R.	11
Schauber, Hubert A.	Centralia	Marion				N	1
Smith, C. H., M. D.	Kenton	Hardin	40 10	83 54	1,562	T	8
Smurr, T. A., M. D.	Cleveland	Cuyahoga	41 37	81 46		T	3
Thompson, Rev. David	Milnersville	Guernsey	40 10	81 45		T. R.	12
Thompson, Prof. H. A.	Westerville	Franklin	40 04	83 00		A	12
Towson, J. W.	Lancaster	Fairfield				T	3
Trembley, J. B., M. D.	Toledo	Lucas	41 39	82 22	604	B. T. R.	12
True, H. A., M. D.	Marion	Marion	40 35	83 08	1,077	T. R.	11
Tuckerman, L. B.	College Hill	Hamilton	39 19	84 26	800	T. R.	12
Tweedy, D. H.	Smithfield	Jefferson	40 20	80 38	1,000	R	2
Williams, Prof. M. G.	Urbana	Champaign	40 06	83 43	1,015	B. T. R.	12
Winchester, Electus D.	Austintown	Ashtabula	41 54	80 52	816	B. T.	2
Winger, Martin	Wooster	Wayne	40 49	81 57	872	T	8

OREGON.

Barnard, A. D.	Corvallis	Benton	44 30	118 06		T	8
Hindman, S. M. W.	Albany	Linn	44 22	123 00	600	R	11

* Above low water in the Ohio river.

List of meteorological stations and observers, &c.—Continued.

PENNSYLVANIA.

Name of observer.	Station.	County.	North latitude.	West longitude.	Height.	Instruments.	No. of months received.
			° ' "	° ' "	Feet.		
Bentley, E. T.....	Tioga	Tioga	42 00	77 00	1,000	T. R.....	12
Bruckart, H. G.....	Silver Spring...	Lancaster	40 05	76 45	.....	T.	8
Brugger, Samuel.....	Fleming	Centre	40 55	77 53	780	T. R.....	12
Darlington, Fencelon.....	Pocopson	Chester.....	39 40	75 37	218	T. R.....	12
Day, Theodore.....	Dyberry	Wayne.....	41 36	75 19	.....	T.	11
Dutton, J. Russell.....	Stevensville	Bradford	41 45	76 35	300	T. R.....	8
Fenton, Elisha.....	Grampian Hills ..	Clearfield.....	41 00	78 40	1,400	B. T. R.	12
Grathwohl, John.....	Blooming Grove ..	Pike	41 30	75 00	.....	T. R.....	11
Hance, Ebenezer.....	Fallsington	Bucks	40 12	74 48	30	B. T. R.	12
Heisely, Dr. John.....	Harrisburg	Dauphin	40 16	76 15	.....	A.	12
Hoffer, Dr. Jacob R.....	Mount Joy	Lancaster	40 08	76 32	.....	B. T. R.	12
James, Prof. C. S.....	Lewisburg	Union	40 58	76 58	.....	A.	12
Kirkpatrick, Prof. Jas. A.	Philadelphia	Philadelphia.....	39 57	75 11	60	A.	12
Kohler, Edward.....	North Whitehall ..	Lehigh	40 44	75 28	450	T.	12
McConnell, E. M.....	New Castle.....	Lawrence	41 00	80 12	.....	T.	12
Martindale, Isaac C.....	Byberry	Philadelphia	40 05	75 00	70	N.	12
Meehan, Thomas.....	Germantown	Philadelphia .....	.....	.....	.....	T.	12
Raser, John Heyl.....	Reading	Berks	40 20	75 57	269	T.	6
Ricksecker, Lucius E.....	Nazareth	Northampton	40 43	75 21	525	T.	9
Smith, Wm., D. D.....	Canonsburg	Washington	40 16	80 10	850	B. T. R.	11
Spencer, Miss Anna.....	Horsham	Montgomery.....	40 00	75 11	250	B. T. R.	12
Spera, W. H.....	Ephrata	Lancaster .....	.....	.....	.....	T. R.....	12
Taylor, John.....	Connellsville	Fayette	40 00	79 36	.....	T.	12

RHODE ISLAND.

Caswell, Prof. Alexis....	Providence	Providence	41 49	71 25	120	A.	5
Crandall, William H.....	Newport	Newport	41 28	71 21	25	T. R.....	12

SOUTH CAROLINA.

Petty, Charles.....	Wilkenerville	Union	34 50	81 36		N.	2
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TENNESSEE.

Doak, S. S. & W. S.....	Greenville	Green	36 05	82 50		T.	3
Stewart, Prof. Wm. M.....	Clarksville	Montgomery	36 29	87 13	481	A.	12
Williams, Edward F.....	Lookout Mount'n ..	Hamilton.....	35 15	85 15	1,626	B. T.	9

TEXAS.

Brown, James.....	Kaufman	Kaufman .....	.....	.....	.....	T.	3
Gantt, W. H., M. D.....	Chappell Hill.....	Washington	30 15	96 21	542	T. R.....	5
Rayel, James T.....	Kaufman	Kaufman	32 30	96 00	.....	N.	10

UTAH.

Bullock, Thomas.....	Wanship	Summit	40 42	111 20	6,200	T.	7
Burgon, George A.....	St. George	Washington	37 11	114 00	.....	T. R.....	2
Pearce, Harrison.....	Salt Lake	Salt Lake	40 45	111 26	4,320	T. R.....	11
Phelps, W. W.....	Rockville.....	Kane.....	37 20	113 40	.....	N.	4

List of meteorological stations and observers, &c.—Continued.

VERMONT.

Name of observer.	Station.	County.	North latitude.	West longitude.	Height.	Instruments.	No. of months received.
			° '	° '	Feet.		
Buckland, Harmon.....	Brandon.....	Rutland.....	43 45	73 00	460	T. R....	9
Cutting, Hiram A.....	Lunenburg.....	Essex.....	44 28	71 41	1, 124	A.....	10
Eaton, Benjamin F., M.D.	Barnet.....	Caledonia.....	44 18	72 05	952	B. T. R.	7
Paddock, James A.....	Craftsbury.....	Orleans.....	44 40	72 30	1, 100	T. R....	12
Paine, Charles L.....	Randolph.....	Orange.....	43 35	72 36	700	T. R....	12
Perry, Rev. John B.....	Wilmington.....	Windham.....	42 53	72 47	1, 250	B. T....	8
Sheldon, Harmon A.....	Middlebury.....	Addison.....	43 59	73 10	398	A.....	12

VIRGINIA.

Meriwether, Charles J.....	near Lynchburg.....	Bedford.....	37 15	79 10	.....	T.....	3
Shriver, Howard.....	Wytheville.....	Wythe.....	36 55	81 04	2, 400	B. T....	8

WASHINGTON.

Swan, James G.....	Neeah Bay.....		48 22	124 37	17	T. R....	9
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WEST VIRGINIA.

McDowell, W. H.....	Romney.....	Hampshire.....				T.....	8
Roffe, Charles L.....	Ashland.....	Cabell.....	38 30	82 16	600	T. R....	9

WISCONSIN.

Breed, E. Everett.....	Embarass.....	Waupaca.....	44 51	88 37	.....	T. R....	12
Curtis, W. W.....	Rocky Run.....	Columbia.....	43 26	89 19	.....	T. R....	11
Eddy, Levens.....	Delavan.....	Walworth.....	42 39	88 37	957	B. T. R.	12
Ellis, Edwin, M. D.....	Odanah.....	Ashland.....	46 33	91 00	610	T.....	3
Hicks, John C.....	Weyauwega.....	Waupaca.....	44 15	88 50	850	T. R....	8
Lapham, Incr'se A., LL.D.	Milwaukee.....	Milwaukee.....	43 03	87 56	604	A.....	12
Lups, Jacob.....	Manitowoc.....	Manitowoc.....	44 07	87 45	658	B. T. R.	12
Mathews, Dr. James.....	Weyauwega.....	Waupaca.....	.....	.....	.....	T.....	1
Mead, H. C.....	Waupaca.....	Waupaca.....	44 20	89 11	1, 000	T.....	12
Moeller, G.....	Plymouth.....	Sheboygan.....	43 44	88 07	870	B. T....	12
Porter, Henry D.....	Beloit.....	Rock.....	42 30	89 04	780	A.....	12
Waite, M. C.....	Baraboo.....	Sauk.....	43 27	89 45	920	T. R....	12
Ward, Prof. Wm. H.....	Ripon.....	Fond du Lac.....	43 54	88 59	.....	B. T....	8
Whiting, William H.....	Geneva.....	Walworth.....	42 30	89 41	600	T.....	8
Winkler, Carl, M. D.....	Milwaukee.....	Milwaukee.....	43 03	87 57	630	B. T. R.	12

Deaths of observers.

Stephen O. Mead, Claremont, New Hampshire, March 18, 1867.

Rev. Dr. Emerson Davis, Westfield, Massachusetts, June 8, 1866.

William H. Denning, Fishkill, New York, October 31, 1866.

Robert McCary, Natchez, Mississippi, July 25, 1866.

Allen Mead, Manchester, Iowa, December 19, 1866.

Dr. James Mathews, Weyauwega, Wisconsin, September 20, 1866.

Colleges and other institutions from which meteorological registers were received during the year 1866, included in the preceding list.

Nova Scotia.....	Acadia College.....	Wolfville.
Canada.....	Magnetic Observatory.....	Toronto.
Alabama.....	Baptist Female Institute.....	Moulton.
	Greene Springs School.....	Havana.
	Spring Hill College.....	Spring Hill.
Arkansas.....	Normal School.....	Helena.
Connecticut.....	Wesleyan University.....	Middletown.
Illinois.....	Lombard University.....	Galesburg.
	Northwestern University.....	Evanston.
Iowa.....	Cornell College.....	Mount Vernon.
	Griswold College.....	Davenport.
	Iowa State University.....	Iowa City.
Kansas.....	Agricultural College.....	Manhattan.
Maryland.....	St. Timothy's Hall.....	Catonsville.
Massachusetts.....	Amherst College.....	Amherst.
	State Lunatic Hospital.....	Worcester.
	Williams' College.....	Williamstown.
Michigan.....	State Agricultural College.....	Lansing.
Missouri.....	St. Louis University.....	St. Louis.
	Grand River College.....	Edinburg.
New Hampshire.....	St. Paul's School.....	Concord.
New Jersey.....	Rutger's College.....	New Brunswick.
New York.....	Columbia College.....	New York.
	Institution for Deaf and Dumb.....	New York.
	Erasmus Hall Academy.....	Flatbush.
	St. Francis Xavier's College.....	New York.
	University of Rochester.....	Rochester.
Ohio.....	Farmers' College.....	College Hill.
	Otterbein University.....	Westerville.
	Urbana University.....	Urbana.
	Woodward High School.....	Cincinnati.
Pennsylvania.....	Central High School.....	Philadelphia.
	Jefferson College.....	Cannonsburg.
	Lewisburg University.....	Lewisburg.
Tennessee.....	Stewart College.....	Clarksville.
	Lookout Mountain Educational Institution.....	Lookout Mountain.
	Tusculum College.....	Greenville.
Texas.....	Institution for Deaf and Dumb.....	Austin.
Wisconsin.....	Beloit College.....	Beloit.
	Ripon College.....	Ripon.

METEOROLOGICAL MATERIAL CONTRIBUTED IN ADDITION TO THE REGULAR OBSERVATIONS.

Agnew, J. C.—Table showing the amount of rain, also the depth of snow, in each month, from May, 1859, to December, 1866, inclusive, at Edina, Knox county, Missouri.

Anderson, W. H.—Monthly mean temperature of a station one mile north of Rockville, Parke county, Indiana, during the years 1862, 1863, 1864, 1865, 1866. Two pages foolscap.

Asiatic Society of Bengal.—Abstract of the results of the hourly meteorological observations taken at the surveyor general's office, Calcutta, in the months of August, September, October, November, and December, 1865.—Meteorological observations taken at Gangarooma, near Kandy, Ceylon, in the month of May, 1864. [Published in the journal of the Society, part 2, Nos. 1 and 2, 1866.]

Bartlett, Erastus B.—Summary of observations for the year 1866, and comparison with the preceding twelve years. Newspaper slip.

Beauchamp, W. M.—Summary of observations for the year 1866, at Skaneateles, New York.

British Museum.—Catalogue of the collection of meteorites exhibited in the mineral department of the British Museum. January 7, 1866. 8 pages, 8vo.

Buckley, S. B.—A preliminary report of the Texas geological survey, by S. B. Buckley. Austin, 1866. 87 pages, 8vo. [Contains remarks on climate of Texas, and tables of rain and temperature.]

Bullock, Thomas.—Observations on temperature and face of the sky, at St. Mary's, Chalk creek, Summit county, Utah Territory, from June to December, 1865. 8 pages foolscap.

Cook, Eugene B.—Report of the meteorologist of the New York Skating Club for the season 1865-'66. 24 pages, 12mo.

Dawson, William.—Summary of observations for the year 1866, at Spice-land, Indiana.

Dijon, Comité Central d'Agriculture.—Journal d'Agriculture de la Côte-d'Or, publié par le Comité Central d'Agriculture de Dijon, sous les auspices de M. le préfet et du conseil général. [Contains monthly tables of meteorological observations made at Dijon, France, by Alexis Perrey.]

Dowell, Greenville, M. D.—The Galveston Medical Journal, a monthly record of medical science. Greenville Dowell, M. D., editor. Galveston, Texas. [Contains tables of meteorological observations at Houston, Texas.]

Fallon, John.—Summary of observations for the year 1866, at Lawrence, Massachusetts. Newspaper.

Geological survey of India.—Catalogue of meteoric stones and meteoric irons in the museum of the geological survey, Calcutta. 4 pages.

Heis, Professor Dr.—Wochenschrift für Astronomie, Meteorologie und Geographie. Redigirt von Professor Dr. Heis, in Münster. 8vo.

Huntington, George C.—Summaries of observations at Kelley's island: Table I. Mean and extreme temperature, amount of rain, force of wind, first appearance of anchor-ice in lake, &c., during the month of December, from 1859 to 1866, inclusive. Table II. Monthly and annual mean temperature from 1860 to 1866, inclusive. Table III. Monthly and annual quantity of rain and melted snow for the years 1860 to 1866, inclusive. Printed slip.

Hyde, Gustavus A.—Summary of observations for the year 1866, and means of eleven years, at Cleveland, Ohio. Printed slip.

Ives, William.—Summary of observations made at Buffalo, New York, during the year 1866. Newspaper.

Jelinek, Dr. K.—Ueber den jährlichen Gang der Temperatur und des Luftdruckes in Oesterreich und an einigen benachbarten Stationen. Von Dr. K. Jelinek, correspondirendem Mitgliede der kaiserlichen Academie der Wissenschaften. Mit 2 Tafeln. Vorgelegt in der Sitzung am 17. November, 1865. Vienna, 1866. 4to, 78 pages.

Kennicott, Robert.—Observations on temperature, rain, snow, winds, and clouds, made at Fort Yukon, Russian America, from January to July, 1861.

Kongelige Danske Videnskabernes-Selskab.—Oversight over det Kongelige danske Videnskabernes Selskabs Forhandlinger og dets Medlemmers Arbejder i Aaret 1864. Af Conferentsraad, Professor G. Forchhammer, Selskabets Secretair. 8vo, 192 pages. [Contains monthly tables of observations at Copenhagen, and other meteorological articles.]

Kongelige Norske Universitet.—Meteorologiske Iagttagelser paa Christiania Observatorium. 1865. Christiania, 1866. 4to, 50 pages.

Koninklijk Nederlandsch Meteorologisch Instituut.—Meteorologisch Jaarboek. Eerste Gedeelte. Waarnemingen in Nederland. Uitgegeven door het Koninklijk Nederlandsch Meteorologisch Instituut. 1865. Utrecht, 1866. Oblong quarto, 198 pages.

Meteorologisch Jaarboek. Tweede Gedeelte. Afwijkingen van Temperatuur en Barometerstand op v-le Plaatsen in Europa. Uitgegeven door het Konink-

lijk Nederlands Meteorologisch Instituut. 1865. Utrecht, 1866. Oblong quarto, 192 pages.

Kron, Dr. F. J.—Thermometer, cloud, and wind record kept at Attaway Hill, near Albemarle, Stanly county, North Carolina, from April to October, 1861, inclusive.

Lapham, I. A., LL D.—Table showing the mean amount of evaporation and of rain in each month of the year, deduced from observations made during five years; also the amount of rain in each month of the year 1866, and the monthly mean of twenty-three years; also the mean temperature for each month during the years 1865 and 1866, and the monthly and annual mean of twenty-two years, at Milwaukee, Wisconsin. Newspaper.

Logan, Thomas M., M. D.—Abstract of meteorological observations made during the year 1866, at Sacramento, California, with extended remarks on the climate of Sacramento. Newspaper.

McAdoo, William G.—Catalogue of plants observed at and near Milledgeville, Georgia, with the times of their leafing, flowering, fructification, and fall of leaf in the year 1866. Two sheets foolscap.

Merrill, John C.—Record of the direction of the wind, morning, noon, and evening, from January to June, 1866, inclusive, at Farmingdale, Queen county, New York. Fourteen pages small pass-book.

Mathews, Joseph McD.—Summary of observations for the year 1866, at Hillsboro', Ohio.

Meteorologische Centralanstalt der schweizerischen naturforschenden Gesellschaft.—Schweizerische meteorologische Beobachtungen, herausgegeben von der meteorologischen Centralanstalt der schweizerischen naturforschenden Gesellschaft, unter Direction von Professor Dr. Rudolph Wolf. Zweiter Jahrgang. 1865. Zurich. 4to.

Meteorological Society, (British.)—Proceedings during the year 1866. Edited by James Glaisher, esq., F. R. S., secretary. 8vo.

Naturforschende Gesellschaft in Emden—Die Regenverhältnisse des Königreichs Hannover, nebst ausführlicher Darstellung aller den atmosphärischen Niederschlag und die Verdunstung betreffenden Grössen, welche beim Wasserbau sowie beim rationellen Betriebe der Landwirthschaft in Betracht kommen. Von Dr. M. A. F. Prestel. Mit einer Regenkarte und zwei lithographirten Tafeln. Emden, 1864. 4to, 56 pages.

Naval Observatory.—Notes on vegetation at the Naval Observatory, Washington, D. C., Captain J. M. Gilliss, superintendent, kept by Mr. James Watt, gardener, during the years 1862 and 1864.

Nieder-Oesterreichische Landes- oder Real-Schule, in St. Pölten.—Zweites Programm der nieder-oesterreichischen Landes- oder Real-Schule in St. Pölten. 1865. 8vo. [It contains "Beiträge zur Meteorologie, St. Pölten, von Karl Swoboda." Twenty-four pages.]

Nova Scotian Institute of Natural Science.—Proceedings of the Nova Scotian Institute of Natural Science, of Halifax, Nova Scotia. Vol. 1, part iv, for 1865-'66. [Contains: Notes on the weather at Halifax, Nova Scotia, during 1865, by Colonel W. J. Myers, F. B. M. S. Also, abstract of observations for the years 1863, 1864, and 1865, at Halifax, by the same.]

Observatorio Magnético y Meteorológico del Real Colegio de Belen de la Compañia de Jesus en la Habana, Francisco Pons, director.—Monthly bulletins of observations. 8vo.

Oesterreichische Gesellschaft für Meteorologie.—Zeitschrift der österreichischen Gesellschaft für Meteorologie. Redigirt von Dr. Carl Jelinek und Julius Hann. I. Band. Vienna, 1866, 8vo., 392 pages.

Plantamour, E.—Résumé météorologique de l'année 1865, pour Genève et le Grand Saint-Bernard, par E. Plantamour, professeur Tiré des Archives des

Sciences de la Bibliothèque Universelle, Août 1866, avec autorisation de la direction. Genève, 1866. 8vo, 142 pages.

Quetelet, Ad.—Étoiles filantes observées à Bruxelles, le 10 Août 1865, par MM. Ad. Quetelet, Ern. Quetelet, et Hooreman.—Sur les orages observés en Belgique pendant le mois d'Août 1865, par M. Ad. Quetelet, secrétaire perpétuel de l'Académie. (Extrait des bulletins de l'Académie Royale de Belgique, 2me série, tome xx, nos. 9 et 10.) 8vo, 15 pages.

Quetelet, Ernest.—Sur l'état de l'atmosphère à Bruxelles, pendant l'année 1865, par M. Ernest Quetelet, membre de l'Académie Royale de Belgique. (Lu à la séance du 3 Février 1866) 8vo, 48 pages.

Reale Osservatorio di Palermo.—Bulletino meteorologico del Reale Osservatorio di Palermo. 4to, 8 pages. Published monthly.

Reichel, Edward H.—Manuscript meteorological journal, kept at Nazareth, Pennsylvania, (sixty miles north of Philadelphia,) from January, 1787, to December, 1792, by Charles Gotthold Reichel, principal of the Nazareth Hall Boarding School for Boys, from 1785 to 1802. [The journal gives the temperature twice a day, the wind, face of the sky, and a part of the time the hygrometer and barometer.]

Royal Society of London.—Results of meteorological and magnetical observations made at Stonyhurst College Observatory, England, during the year 1865. 31 pages, 12mo.

Sartorius, Dr. Charles.—Summary of observations for the year 1866, at Mirador, Mexico.

Scottish Meteorological Society.—Journal of the Society for the year 1866. Published quarterly.

Société de Géographie, Paris.—Observations thermométriques faites à Djeddah dans le courant de l'année 1864, par M. Pellissier de Reynaud, consul de France à Djeddah. (Published in the bulletin of the society, 5th series, vol. 10. July to December, 1865, pp. 197–202.)

Société Météorologique de France.—Annuaire.

Spanish Minister.—Observaciones meteorológicas hechas en el Observatorio Astronómico de Santiago, durante el año de 1865, i en el Faro de Valparaíso hasta Agosto del Mismo, inclusive. Santiago de Chile, 1866. 46 pages. 1866.

State Department, Washington.—The Royal Standard, January 12, 1867, a newspaper published at Grand Turk, Turk's Island, containing the report of President Moir to his government in relation to the hurricane of September 30, 1866.

Tayloe, Edward D.—Meteorological and agricultural notes, from 1831 to 1865, inclusive, at Powhatan Hill, King George county, Virginia. On sixteen sheets Smithsonian blanks.

Trembley, Dr. J. B.—Annual meteorological synopsis for the year 1866. By J. B. Trembley, M. D., Toledo, Ohio. 8vo, 16 pages.

Valentin, Felipe.—Observations (thermometer, psychrometer, state of atmosphere, wind, and rain) made daily at 7 a. m., 2 p. m., and 7 p. m., at Limon, in the province of Cartago, republic of Costa Rica, from the 16th of October, 1865, to August 31, 1866.

Vivenot, jun., Dr. Rudolph Edl. v.—Beiträge der klimatischen Evaporationskraft, und deren Beziehung zu Temperatur, Feuchtigkeit, Luftströmungen und Niederschlägen, von Dr. Rudolph Edl. v. Vivenot, jun. Erlangen, 1866. 8vo, 103 pages.

Walker, David, M. D.—Observations of barometer, thermometer, winds, and weather, taken at Victoria, Vancouver's island, from December, 1863, to June, 1864; also at Fort Steilacoom, Washington Territory, during the same time. 16 pages foolscap.

Whitehead, W. A.—Summary of observations for the year 1866, at Newark, New Jersey, and comparison with the preceding twenty-two years. Newspaper.

Wilbur, B. F.—Abstract of meteorological register kept at West Waterville, Maine, during the year 1866. Newspaper.

Williams, Prof. M. G.—Summary of observations for the year 1866, at Urbana, Ohio.

Unknown—Levant Herald, Constantinople, January 9, 1867, containing a summary of the weather, including observations of the barometer and thermometer, at Constantinople, for each month of the year 1866

REPORT OF THE EXECUTIVE COMMITTEE.

The executive committee respectfully submit the following report in relation to the funds of the Institution, the receipts and expenditures for the year 1866, with estimates for the year 1867.

Statement of the fund.

The original amount received as the bequest of James Smithson deposited in the treasury of the United States as a trust fund, by act of Congress, approved August 10, 1846, section. 2..... \$515,169 00

The residuary legacy of James Smithson, received in 1865,
invested in United States 7.30 bonds. 26,210 63

Extra fund, derived from saving of interest, &c., invested in stock,
viz :

United States 7.30 bonds 27,939 37

	Par value	Cost.	Present value.	Interest unpaid.	
Indiana 5 p. cent.	\$75,000	\$63,000 00	\$69,750	.....	
Virginia 6 p. cent.	53,500	49,832 50	31,565	\$17,655	
Tennessee 6 p. cent.	15,000	11,167 50	9,300	.....	
Georgia 6 p. cent.	500	500 00	500	165	
Washington 6 p. cent.	100	100 00	100	.....	
	<u>144,100</u>	<u>124,600 00</u>	<u>111,215</u>	<u>.....</u>	<u>111,215 00</u>

Total productive and unproductive capital..... \$680,534 00

Receipts and expenditures during the year 1866.

RECEIPTS.

Balance in hands of the Treasurer, January, 1866.....	\$13,718 63
Interest on the original bequest of Smithson, viz., 6 per cent. on \$515,169	30,910 14
Interest on Indiana stock, viz., 5 per cent. on \$75,000.....	3,750 00
Interest on Tennessee stock, viz., 6 per cent. on \$15,000.....	900 00
Premium for sale of coin, &c	40,691 26
Interest on temporary deposit with United States Treasurer.....	380 82
Proceeds of sale of \$600, coupons, for interest due on Tennessee stock.....	402 00

Total funds available for the year 1866..... 90,752 85

EXPENDITURES.

For building and furniture.	\$36,428 66
“ general expenses.	11,577 24
“ publications and researches.....	13,109 95
“ library, museum, and literary exchanges.....	6,745 77
	<u>67,861 62</u>

Balance in hands of the Treasurer, January, 1867 \$22,891 23

Statement in detail of the expenditures during the year 1866.

BUILDING.

Reconstruction of parts injured or destroyed by fire,	\$33,291 81	
Repairs and incidentals to old parts	2,181 54	
Furniture and fixtures	955 31	
		\$36,428 66

GENERAL EXPENSES.

Meetings of the board : travelling expenses and hack hire	127 00	
Lighting and heating	1,555 54	
Postage	452 84	
Stationery	485 14	
Incidentals: hardware, tools, materials for cleaning, &c.	1,213 12	
Salaries : Secretary, chief clerk, bookkeeper, clerks, janitor, messenger, and laborers	7,743 60	
		11,577 24

PUBLICATIONS, RESEARCHES, ETC.

Smithsonian Contributions to Knowledge	3,776 17	
Smithsonian Miscellaneous Collections	5,702 67	
Smithsonian Annual Report	1,377 80	
General printing	243 27	
Meteorology	1,017 90	
Apparatus for experiments and researches	496 85	
Laboratory, chemicals, &c.	122 98	
Exploration	372 31	
		13,109 95

LIBRARY, MUSEUM, AND LITERARY AND SCIENTIFIC EXCHANGE.

Cost of books	873 24	
Assistants in library, (January to July)	600 00	
Literary and scientific exchanges	2,009 33	
Assistants in museum, and incidentals for collections,	1,568 04	
Freights on specimens, books, &c., for museum and library	1,695 16	
		6,745 77

Total expenditures during the year 1866	\$67,861 62
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The foregoing statement is an actual exhibit of the Smithsonian funds, irrespective of credits and payments which have been made in behalf of other parties. For example, the Institution during the past year has paid several bills for work done on account of the government, the amount of which has been refunded and credited to the appropriations from which the expenditure was made.

The Commissioner of Agriculture has continued to pay one-half of the salary of the meteorological clerk, who has been engaged during the year in preparing

the abstracts from the reports of the observers for the Monthly Bulletin of the Agricultural Department.

The appropriation received for the preservation of the collections of the exploring expeditions of the United States has been expended as heretofore, under the direction of the Secretary of the Interior, in assisting to pay the expenses of employés in the museum, and the cost of arranging and preserving the articles. This appropriation is \$4,000 annually, but during the last year an additional sum of \$2,000 was received, due for the year 1865, which had not been paid on account of the failure of the appropriation bill to pass Congress at the usual time.

The specimens intrusted to the care of the Institution are in a good condition, although on account of the unfinished state of the building much care and labor have been required to preserve them from the effects of dampness.

The committee have examined three hundred and eighty-two vouchers, embracing several thousand items, for payments during the year, amounting collectively to \$75,211 35. All these vouchers are for moneys actually expended, and for legitimate purposes of the Institution, and are in the form which has heretofore been in use. The committee, however, would advise that in future the following rules, similar to those in use by government, be adopted:

1. Vouchers to be made out on blanks furnished by the Institution.
2. All receipts for money paid to be signed by a principal, and not by an agent unless legally authorized.
3. Each voucher to be complete in itself; no payments to be made on a running account.

During the year the State of Tennessee made arrangements to issue six per cent. coupon bonds to pay off the arrearage of interest which had accumulated during the war. The claims for interest to be converted into these new bonds were limited to amounts of not less than \$1,000. As the interest due the Institution was \$3,600, Mr. Riggs was instructed to sell the odd \$600 worth of coupons and convert the remaining \$3,000 into stock. The sale of these coupons yielded \$402, which sum has been credited in the receipts of the Institution for the year, and three bonds of one thousand dollars each, added to the permanent investment.

It is impossible, until it is known what further action the board will take in regard to the disposition of the stocks, to give a definite estimate of the receipts and expenditures during the present year. The following, however, may be considered as an approximation sufficiently exact for the general appropriations for the operations of the Institution, and the continuance of the work upon the building:

Estimates for the year 1867.

RECEIPTS.

Balance in hand January, 1867	\$22,891 23
Interest on original bequest	30,910 14
Probable premium on coin	10,000 00
Interest on \$54,150 in United States 7.30 bonds, unpaid coupons from February 15, 1865, to February 15, 1867	7,905 90

Coupons due on same August 15, 1867	\$1, 976 47
Interest on Indiana 5 per cent. stock	3, 750 00
Interest on Tennessee 6 per cent. stock	900 00
Interest on Washington 6 per cent. stock for 1863-'4-'5-'6 and -'7	30 00
Total available income	<u>78, 363 74</u>

It is proposed to apply this as follows .

1. For the operations and support of the Institution, viz : Publications, researches, literary and scientific exchanges, museum, salaries, and general expenses	\$40, 000 00
2. For the reconstruction of the building	38, 363 74
	<u>78, 363 74</u>

The income of \$78,363 74 above stated does not include any interest on the Virginia and Georgia stocks. Their value at the present time is about \$32,000, being the amount of the unproductive funds of the Institution.

The Indiana stock yields but five per cent. on the par value. It can now be sold and lent to the United States at six per cent., which will increase the annual income from this source at least \$300.

The Georgia and Washington stocks can now be sold at par, and the proceeds lent to the United States will increase the annual income from this source at least \$30.

The Tennessee stock at present is worth about 62 per cent. on its par value. It pays 6 per cent. on the par value, and about 9.6 per cent. on the market value.

The Virginia stock is worth at the present time about 59 per cent. on the par value, and pays no interest. A large amount of the debt of this State is secured by stocks in the railroads and other internal improvements amounting to many millions, and it is therefore considered most advantageous to retain this stock until it commands a more favorable price.

The committee, in conclusion, have the satisfaction of reporting to the regents the fact that the entire bequest of Smithson remains undiminished in the treasury of the United States ; that all the expenditures from the organization of the establishment to the present time, including nearly \$400,000 on the building, have been made exclusively from the income derived from the bequest, while at the same time the efficiency of the Institution has been increased by an extra fund of upwards of \$100,000.

RICHARD DELAFIELD,
RICHARD WALLACH,
Executive Committee.

NOTE.—Since the presentation and adoption of this report, by authority of the Board, the United States 7.30's, the Indiana, Georgia, and Tennessee stocks have been sold, and the proceeds added to the permanent capital, increasing it from \$515,169 to \$650,000.

REPORT OF THE BUILDING COMMITTEE.

The restoration of the building has been prosecuted during the last year as rapidly as the funds at the disposal of the committee and the character of the work would permit.

It will be recollected that the damage occasioned by the fire consisted principally in the destruction of the roof and upper story of the main building, the interior of the large north and south central projections, and the towers connected with them.

It will be further recollected that in the reconstruction of the building, as stated in the last report, the committee were governed by the following considerations :

1. To render the work entirely stable, both as to material and mode of construction.

2. To render it thoroughly fire-proof.

3. In view of the great cost at present of material and workmanship, and the means at the disposal of the committee ; to do first, such work as would be necessary to preserve the stability of the several parts of the building, and prevent injury by the weather.

Immediately after the fire, a temporary covering was placed over the main building in such a position as not to interfere with the subsequent erection of the permanent roof. To secure the northern towers, a 9-inch lining of brick was laid in cement from the bottom to the top, and firmly united to the original wall. In this and all the other parts of the building reconstructed, wrought-iron girders and brick arches were substituted for wooden beams and floors.

The large south tower was so much injured that thirty feet of the upper portion had to be taken down and rebuilt, the cost of which was much enhanced by the necessity of recutting a large amount of new stone for the facing. This tower has been divided into six stories, affording as many large rooms, the lower for an extension of the museum, an upper one for the meetings of the Regents, and the others for storage, &c. The offices for the accommodation of the Secretary and assistants will be in the northern towers and connecting space.

The principal access to the second story of the main building is by two large iron staircases, one on either side of the northern entrance. These have been completed.

All the towers and connections with the main building have been covered with substantial roofs. After much inquiry and personal investigation it was concluded to adopt the plan for the roof of the main building of wrought-iron framing, and slate covering, the latter secured in place by wire to iron purlines, and pointed underneath by a coating of cement.

A contract was made for the roof in July with the Phoenix Iron Company, of Philadelphia, the proposals from which were the lowest ; but owing to unex-

pected delays the iron frame was not received until too late in the season for putting on the slate, without injury to the cement by frost. The work will, however, be prosecuted as early in the spring as the condition of the weather will permit.

The inside lining of the walls of the second story of the building, which had been much injured by the fire, has been removed and its place supplied by a new 9 inch brick wall laid in cement, securely tied and clamped to the outer stonework.

The chairman of the committee has given personal attention to the work in its progress, and can state from actual knowledge that the plans, material and workmanship are of a satisfactory character, alike creditable to the talents and careful supervision of Mr. Cluss, the architect.

The following is an exhibit of the whole amount expended up to the end of the year 1866, on the reconstruction of the building :

Detailed statement of payments made on the reconstruction of the Smithsonian building, from January 1, 1865, to January 1, 1867.

Iron-work—beams, doors, frames, &c.....	\$12,728 58
Iron-work—staircase north hall.....	4,043 25
Iron-work—new roof.....	482 55
Stone, from quarry at Seneca creek, Maryland.....	1,468 94
Stone cutting and setting.....	14,165 40
Brick, for walls, floors, &c.....	7,242 27
Bricklayers.....	9,371 34
Lumber.....	2,185 84
Carpenters and laborers.....	6,571 22
Cement.....	1,436 52
Sand and lime.....	558 69
Blacksmiths.....	544 82
Hardware—nails, tools, clamps, steel, &c.....	705 32
Rope, blocks and derricks.....	173 15
Painting.....	46 00
Tin roof on northeast tower.....	168 05
Felt and pitch for repairing temporary roof.....	212 92
Freight and hauling on iron beams and stone.....	1,027 89
Slate for new roof.....	182 60
Compensation of architect.....	1,788 75
	65,104 10

In addition to the above amount which was expended for the reconstruction of the building, under the superintendence of Mr. Adolf Cluss, architect, the following amounts were paid for work done for the preservation of the building after the fire :

Removing debris and clearing up.....	\$1,055 29
Temporary wooden roof.....	1,974 25
Carpenter's work.....	254 75
Blacksmith's work.....	28 25
Glazier's work.....	121 95
Plasterer's work.....	52 00
Glass, oil and paint.....	544 50
	4,030 99

Making the whole amount expended on the building in consequence of the fire, during 1865 and 1866.....	\$69, 135 09
There was also expended during 1865 and 1866 for general repairs on the parts of the building not injured by the fire, the introduction of additional water-pipes, new plugs, hose, hardware, lumber &c., the sum of.....	4, 268 97
Whole expenditure on building for 1865 and 1866.....	<u>\$73, 404 06</u>

It is proposed during the present year to complete the roof of the main building and all the rooms in the projections and towers, leaving the large room of the upper story of the main building unfinished until funds may be accumulated for the purpose, and its future use be determined upon.

Respectfully submitted :

RICHARD DELAFIELD,
Chairman Building Committee.

WASHINGTON, *February* 1867.

JOURNAL OF PROCEEDINGS
OF
THE BOARD OF REGENTS.

WASHINGTON, *January* 16, 1867

In accordance with a resolution of the Board of Regents of the Smithsonian Institution, fixing the time of beginning of their annual session on the third Wednesday of January in each year, a meeting was called for this day.

No quorum being present, the Board adjourned to meet on Monday, January 28.

WASHINGTON, *January* 28, 1867.

A meeting of the Board of Regents was held at 8 p. m., in the laboratory of the Institution.

Present: Chief Justice Chase, Chancellor of the Institution; Hon. Garret Davis, Hon. J. W. Patterson, Hon. J. A. Garfield, General Richard Delafield, Professor Louis Agassiz, Hon. Richard Wallach, Mr. William B. Astor, and the Secretary, Professor Henry.

The Chancellor took the chair.

Professor Henry presented a general statement of the operations of the Institution during the year, and of the present condition of the funds.

He also stated that, on account of the advanced state of the session of Congress at the time of the passage of the resolution by the Board directing a memorial to be presented in regard to increasing the amount of the Smithsonian capital in the treasury of the United States, and also on account of the apprehension that a larger sum would be required for the completion of the building than was at first expected, he had deferred action until the present session of the Regents, when further instructions could be given in regard to the matter.

After remarks by the Chancellor and other members of the Board relative to the desirableness of increasing the amount in the treasury as the best means of permanently securing the capital of the Institution, and of exhibiting to the world the care and judgment with which the finances have been managed,

On motion of Mr. Wallach, the following resolution was adopted:

Resolved, That a committee of three be appointed to present a memorial to Congress in behalf of the Board of Regents, requesting the passage of an act authorizing the Treasurer of the United States to receive into the treasury, on the same terms as the original bequest, the residuary legacy of James Smithson, now in United States bonds in the hands of said Treasurer, namely, \$26,210 63, together with such other sums as the Regents may from time to

time see fit to deposit, not exceeding, with the original bequest, the sum of one million dollars; and that the income which has accrued or which may accrue from said residuary legacy be applied in the same manner as the interest on the original bequest.

The Chancellor appointed Messrs. Davis, Patterson, and Garfield as the committee.

General Delafield, from the Building Committee, made a report relative to the work done and the expenditures on the reconstruction of the building during the past year.

On motion of General Garfield, the report was accepted and the committee continued.

Professor Agassiz remarked that he had just read the report of the Librarian of Congress, in which it was stated that the addition of volumes from the Smithsonian Institution had increased the library of Congress one-third, and he wished to call attention to the source of the accumulation of so large and valuable a library as that of the Smithsonian, one of the best of the kind in the world. He attributed it to the policy which had been proposed by the Secretary, and so long sustained by the Regents, of publishing original contributions to science, and sending these, with the greatest liberality, to every part of the world, in return for which so many volumes of the transactions of learned societies had been received, and without which system of publication and exchange the present reputation of the Institution and such a library could not have been acquired.

The Secretary stated that, since the last meeting, the death had occurred of Mr. W. W. Seaton, Treasurer of the Institution and one of the original Regents.

Mr. Seaton was for many years mayor of the city of Washington, and in several of his messages recommended the councils to urge Congress to take measures for the organization of the Smithsonian Institution, and it was, finally, through his personal influence and that of others interested in the cause of science, that the law of 1846, authorizing its establishment, was passed. The mayor of Washington is ex-officio, a Regent, a provision chiefly due to the zealous interest which Mr. Seaton had manifested in the advocacy of the measure. At the first session of the Board of Regents he was appointed Chairman of the Executive Committee, a member of the Building Committee, and Disbursing Officer. At the close of his term as Regent he was elected Treasurer, which office he retained until his death, rendering gratuitous service during the whole period.

On motion of Mr. Wallach, the following resolutions were adopted:

Resolved, That the Regents of the Smithsonian Institution have learned with deep regret the decease of WILLIAM W. SEATON, late Treasurer of the Institution, who has been connected with it from its organization, and was one of the original members of the Board. His long and gratuitous services to the Institution entitled him to our thanks, and his loss, in common with the citizens of Washington and of the whole country, we deplore.

Resolved, That a copy of this resolution be transmitted to the family of the deceased.

On motion of General Garfield, the Secretary was directed to have these resolutions, and a suitable notice of the late Mr. Seaton, inserted in the next annual report.

The Secretary stated that it would be necessary to make provision for supplying the place of Mr. Seaton, and perhaps some new arrangements in regard to the method of keeping the accounts, paying bills, &c.

The Chancellor suggested that the income of the Institution should be placed in the treasury of the United States, or in a government depository; and,

On motion, it was

Resolved, That a committee be appointed to consider the subject of the proper deposit of the income, and of any change which might be necessary in regard to the system of accounts, and report at the next meeting.

The Chancellor appointed General Delafield, General Garfield, and the Secretary as the committee.

The Board then adjourned to meet on Friday evening, at 7½ o'clock.

WASHINGTON, *February* 1, 1867.

A meeting of the Board of Regents of the Smithsonian Institution was held this day at 8 o'clock p. m. in the laboratory of the Institution.

Present: Chief Justice Chase, Chancellor; Hon. L. F. S. Foster, President of the Senate; Hon. L. Trumbull, Hon. J. W. Patterson, Hon. J. A. Garfield, Hon. J. F. Farnsworth, General R. Delafield, Professor Louis Agassiz, Hon. R. Wallach, and the Secretary, Professor Henry.

The Chancellor took the chair.

The minutes were read and approved.

The Secretary presented a petition from William De Beust, asking for remuneration for losses by the fire at the Institution.

On motion of Mr. Foster, it was

Resolved, That the Secretary be authorized to settle with William De Beust at a fair valuation for his tools lost during the fire at the Institution in January, 1865, in full payment of his claims, the amount not to exceed five hundred dollars.

The Secretary presented the following memorial which had been offered to Congress by the special committee:

MEMORIAL OF THE BOARD OF REGENTS OF THE SMITHSONIAN INSTITUTION.

To the honorable the Senate and House of Representatives in Congress assembled:

The Board of Regents of the Smithsonian Institution have directed the undersigned to transmit to your honorable body the resolution herewith appended, and to solicit the passage of an act in accordance therewith.

It is known to your honorable body that the original sum received into the United States treasury from the bequest of James Smithson, of England, was

\$515,169, which was considered a trust fund, the interest alone to be applied to carrying out the purpose of the testator, viz: "The increase and diffusion of knowledge among men."

This, however, was not the whole of the Smithsonian bequest, the sum of £5,015 sterling having been left by Hon. R. Rush, the agent of the United States, as the principal of an annuity to the mother of the nephew of Smithson.

The annuitant having died, the sum of \$26,210 63 has been received from this source, and is now in charge of the Secretary of the Treasury of the United States; and no provision having been made in the act of August 10, 1846, establishing the Institution, for the disposition of this remainder of the legacy, your memorialists, in behalf of the Board of Regents, now ask that it be added to the original bequest on the same terms; and that the increase which has arisen from interest or otherwise on the sum before mentioned, also in the hands of the Treasury Department of the United States, be transferred to the Board of Regents for assisting to defray the expense of the reconstruction of the building, and for other objects of the Institution.

And your memorialists would further ask that the Board of Regents be allowed to place in the treasury of the United States, on the same terms as the original bequest, such sums of money as may accrue from savings of income and from other sources, provided the whole amount thus received into the treasury shall not exceed one million dollars.

The sole object of this request is the permanent investment and perpetual security of the entire Smithsonian bequest and such other sums as may be accumulated from savings of accrued interest, legacies, &c.

And your memorialists will ever pray, &c.

S. P. CHASE,

Chancellor.

JOSEPH HENRY,

Secretary Smithsonian Institution.

Resolved, by the Board of Regents of the Smithsonian Institution, That an application be made to Congress for an act authorizing the Treasurer of the United States to receive into the treasury, on the same terms as the original bequest, the residuary legacy of James Smithson, now in United States bonds in the hands of said Treasurer, namely, \$26,210 63, together with such other sums as the Regents may from time to time see fit to deposit, not exceeding, with the original bequest, the sum of \$1,000,000; and that the income which has accrued or may accrue from said residuary legacy be applied in the same manner as the interest on the original bequest.

Mr. Patterson stated that in behalf of the committee he had presented the memorial to the House of Representatives, with a bill in accordance therewith, which had passed unanimously that day, and been transmitted to the Senate.

Mr. Trumbull stated that this bill had also unanimously passed the Senate, and only awaited the signature of the President to become a law.

The subject of the future policy of the Institution in regard to the museum and the appropriation of the large hall in the second story of the building, was brought before the board by the Secretary, and remarks were made by Professor Agassiz, Mr. Patterson, General Garfield, General Delafield, the Chancellor, and the Secretary.

On motion of Mr. Patterson, it was

Resolved, That a committee be appointed to consider what will be the best use for the large room in the second story of the main building of the Institution.

The Chancellor appointed Messrs. Trumbull, Patterson, Agassiz, and the Secretary as the committee.

General Delafield, from the special committee appointed at the last meeting in regard to the depository of the funds, reported in part, and asked for further time, which was granted.

The Board then adjourned to meet at the call of the Secretary.

FEBRUARY 22, 1867.

A meeting of the Board of Regents was held at 7 p. m., in the room of the Committee on Foreign Affairs, House of Representatives, United States Capitol.

Present: Chief Justice Chase, Chancellor, Hon. W. P. Fessenden, Hon. J. W. Patterson, Hon. J. A. Garfield, Hon. J. F. Farnsworth, Hon. R. Wallach, General R. Delafield, and Professor Henry, Secretary.

The Chancellor took the chair and the minutes were read and approved.

The Secretary stated that it had become his painful duty at this time to announce the departure from life of another and one of the most important and highly esteemed members of the Board. Since the last meeting Professor Alexander Dallas Bache, head of the United States Coast Survey and Regent of the Smithsonian Institution, had, after a protracted illness, died, on the 17th February, at Newport, Rhode Island, in the sixty-first year of his age; that though this occurrence must be felt as a sad calamity by all familiar with the progress of art, science, and education in this country for the last forty years, and by all who had been favored with a personal acquaintance with the deceased, yet he begged to be permitted to say that none, save his bereaved widow, could feel the loss more deeply than himself. He had been on terms of brotherly association with him for more than thirty years. It had been principally through the influence of Professor Bache that he had been induced to venture to accept the appointment of Secretary of this Institution, and that with the sympathy, counsel and support of the deceased, he had been enabled, through all the eventful changes which had since taken place, to continue the discharge of the responsible duties of the office.

On motion of Mr. Patterson, it was

Resolved, That the highest honor is due to the memory of our respected and beloved associate, Professor ALEXANDER DALLAS BACHE, who, through so many years of active life, has devoted, unselfishly and with untiring energy, great talents, profound acquirements, and undeviating integrity to the advance of art, science, education, and philanthropy.

Resolved, That in the death of our lamented associate, this Institution, of which he was a Regent and one of the executive committee from its first organization to the time of his death, has lost an efficient collaborator, a sagacious counsellor, and zealous supporter.

Resolved, That the members of the Board, in common with the Secretary, lament in his departure the loss of a warm and tried personal friend, and that they will always cherish the memory of his genial and sympathetic disposition, his

gentle and prepossessing manners, his refined taste, high moral perceptions, and unswerving advocacy of the right.

Resolved, That a copy of these resolutions be transmitted to the widow of the deceased, and that the Secretary prepare a suitable eulogy for insertion in the next Annual Report.

General Delafield presented the annual report of the Executive Committee, which was read and adopted.

The Secretary presented the following copy of the act of Congress relative to the increase of the trust fund, referred to at the last meeting of the Board, and a statement of what had been done in accordance with it.

[PUBLIC—No 20.]

AN ACT authorizing the Secretary of the Treasury to receive into the treasury the residuary legacy of James Smithson, to authorize the Regents of the Smithsonian Institution to apply the income of the said legacy, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Treasury be, and he is hereby, authorized and directed to receive into the treasury, on the same terms as the original bequest, the residuary legacy of James Smithson, now in United States bonds in the hands of said Secretary, namely, twenty-six thousand two hundred and ten dollars and sixty-three cents, together with such other sums as the Regents may from time to time see fit to deposit, not exceeding with the original bequest the sum of one million dollars.

SEC. 2 *And be it further enacted*, That the increase which has accrued, or which may hereafter accrue, from said residuary legacy, shall be applied by the Board of Regents of the Smithsonian Institution in the same manner as the interest on the original bequest, in accordance with the provisions of the act of August tenth, eighteen hundred and forty-six, establishing said Institution.

Approved, February 8, 1867.

The Secretary stated that in accordance with the directions of the Board of Regents, and the authority conferred by the above act, he had increased the amount of the Smithsonian fund in the treasury of the United States on the 19th of February, 1867, to \$550,000, in the following manner :

The interest, at 7 3-10 per cent., due for two years, to February 15, 1867, on the \$54,150 U. S. bonds, was collected, viz :	\$7, 905 90
\$25,400 of the bonds were taken by the Treasury Department at 6 per cent. premium, yielding Bonds	\$25, 400
Premium	1, 524
	26, 924 00
Interest from 15th February to 19th, four days	20 32
Amount realized	34, 800 22
Amount placed in the United States treasury, to be added to the original trust fund, \$515,169, (making it \$550,000)	34, 831 00
Leaving a balance in cash of	\$19 22

This balance was deposited with Riggs & Co. to the credit of the Smithsonian account.

After discussion as to the further increase of the permanent capital,

On motion of Mr. Wallach, it was

Resolved, That the Chancellor and Secretary be directed to dispose immediately of the remaining United States 7-30 bonds, and the Indiana, Georgia, and Washington bonds, now held by the Institution, and, if possible, from the proceeds to place an additional hundred thousand dollars in the treasury of the United States.

Mr. Patterson requested further time for the committee on the future use of the large hall in the main building of the Institution, which was granted.

General Delafield presented the following report from the special committee :

REPORT ON ACCOUNTS, ETC.

The committee to whom was referred the subject of the deposit of the income, and any changes which may be advisable in the system of accounts, respectfully report that they have carefully considered the matters referred to them, and recommend as follows :

1. That the income being collected according to law, under the authority of the Chancellor and Secretary, be deposited in a national bank, which is also an authorized government depository, subject to draft, as hereinafter provided.

2. That no money be drawn from the depository except for the payment of accounts which have been examined and approved by the Secretary of the Institution, and which are in accordance with appropriations made by the Regents.

3. That all payments for bills exceeding twenty dollars, be made by separate checks, drawn by the Secretary on the depository, and that for bills of less amount, a check may be drawn for a number, as exhibited in a single statement.

4. That there be rendered quarterly to the Executive Committee, by the Secretary, an account current, accompanied by abstracts of disbursements, supported by receipted vouchers, for the expenditure of all money drawn from the depository. These vouchers to be made, as far as practicable, in accordance with the forms hereto annexed, each voucher being complete in itself, and to contain the facts and information thereon indicated.

5. That a check-book, ledger, and such other books of record as may be necessary, be kept in the office of the Secretary, so as to exhibit at any time the financial condition of the Institution. The check-book shall indicate not only the sums deposited, and drawn, but also the sources whence they were derived, and the appropriation under which they were paid.

6. That there be obtained from the depository, quarterly, an account current of receipts and expenditures, to be compared by the Executive Committee with the accounts of the Secretary.

7. That the Executive Committee make a quarterly examination of the books and accounts of the Institution, and, as usual, an Annual Report of the Board of Regents.

Respectfully submitted :

RICHARD DELAFIELD,
JAMES A. GARFIELD,
JOSEPH HENRY,

Committee

FEBRUARY 22, 1867.

On motion, the report was adopted.

Professor Henry announced the death of two gentlemen who had long been identified with the Institution in connection with explorations and collections in natural history, Robert Kennicott, esq, of Illinois, and Dr. Henry Bryant, of Massachusetts.

On motion of Mr. Wallach, the following resolutions were adopted :

Resolved, That the Board of Regents have heard with deep regret of the death of Mr. ROBERT KENNICOTT and Dr. HENRY BRYANT, gentlemen so long associated with the Institution in its system of explorations and collections relative to natural history, and that it tenders to the families and friends of the deceased their heartfelt condolence in their loss.

The Secretary presented the usual account of the operations of the Institution for the year 1866, which was accepted, and, on motion of Mr. Wallach, it was

Resolved, That the Secretary communicate the annual report of the Board of Regents to Congress.

The Board then adjourned *sine die*.

A SKETCH OF THE SERVICES OF THE LATE HON. W. W. SEATON IN CONNECTION WITH THE SMITHSONIAN INSTITUTION, AND SOME NOTICES OF HIS LIFE AND PERSONAL CHARACTER.

AMONG the many friends and enlightened advocates of the Smithsonian Institution, as at present established, none has been more constant and more efficient than the distinguished and lamented citizen to whose memory the following brief and imperfect notices are dedicated. These notices are designed, in the first place, to convey some idea of the character and value of his services in connection with the above-named establishment, as well by his co-operation in securing for it as prompt and suitable a commencement as the circumstances of the time permitted, as by sustaining eventually that plan of organization which corresponded most nearly with the terms and spirit of the bequest to which it owes its existence. He is to be remembered also as a benefactor of the Institution by his gratuitous and faithful discharge, for a series of years, of one of its most responsible executive offices.

As is well known, the Smithson fund, paid into the treasury of the United States in 1838, had been, with other moneys, lent by the government to the State of Arkansas, and remained for eight years without appropriation to any object contemplated by the donor. In 1846 Mr. Seaton, being then mayor of Washington, and surpassed by no one in zeal for the public good and in the influence due to his rare social qualities, his known integrity, and peculiarly winning and unaffected eloquence, united with other gentlemen of like feelings in urging upon Congress the organization of an establishment which should at length do justice to the benevolent and far-sighted views which had dictated the bequest. Their labors, after much opposition, were finally crowned with success; the good faith of the country was redeemed by an unconditional assumption of the debt incurred by the improper disposition of the fund, which was now declared to be a permanent deposit in the treasury of the United States for the objects of the trust, while interest also was allowed upon the money from the time of its receipt in this country. The Institution, organized in accordance with these resolutions, was placed under the guardianship of fifteen regents, among whom was included the mayor of the city of Washington, a provision chiefly due to the zealous interest which had been manifested by Mr. Seaton in his enlightened advocacy of the enterprise.

At the first meeting of the Board of Regents he was elected treasurer, and subsequently one of the building committee. The former office he continued to hold until the time of his death, and during the whole of this period, nearly twenty years, discharged its duties without other compensation than the pleasure he derived from an association with the Institution and the laudable pride he felt in

contributing to its prosperity and usefulness. It is well known that at the time of the organization of the Institution a wide diversity of opinion existed as to the practical means which would be most suitable for realizing the objects of the legacy. Mr. Seaton, on mature reflection, finally gave his cordial support to the policy which sought to impress upon the Institution a truly cosmopolitan character. He strenuously advocated the plan which the Secretary, then recently elected, had been invited to submit to the Board of Regents, and which looked to the advancement of knowledge chiefly through the encouragement and publication of original researches, a system which, without neglecting other available means for the promotion and diffusion of scientific enlightenment, may be claimed, without undue pretension, to have made the Institution favorably known, and to have exerted a well-recognized influence wherever men occupy themselves with intellectual pursuits.

The relation borne by Mr. Seaton to the city of Washington, the delight with which he watched and aided its progress, a certain native taste also for artistic embellishment, led him to take special interest in the architectural character of the Smithsonian building and the ornamentation of the public grounds around it.

Mr. Seaton was a constant attendant at the meetings of the Board of Regents, and from his familiarity with the early history of the Institution and the state of the funds, as well as from his long experience in public office, was enabled to offer suggestions, always marked by clearness of conception and soundness of judgment. The social attentions which he was accustomed to extend to the regents, especially those who were called from abroad to attend the annual meetings, and to gentlemen invited to lecture before the Institution, were but the expression of his characteristic hospitality; but by thus adding to the pleasure of their sojourn in Washington, he contributed largely to increase the number of its friends and supporters. The columns of the *National Intelligencer*, under his direction, were always open to the defence of the policy adopted and the course pursued by the Institution, and he rarely failed to soften by the courtesy of his manner and the moderation of his expressions, any irritable feeling which might arise in the discussion of conflicting opinions. It would, indeed, be difficult to say in how many and in what various ways he contributed to the popularity as well as to the true interests of the Institution. The Secretary, who was in the habit of conferring with him on all points requiring mature deliberation, may with justice acknowledge that he never failed to derive important assistance from the wisdom of his counsels.

Of a man so highly honored and, what in his case is a more distinctive phrase, so greatly beloved by his fellow-citizens, the following biographical account, gathered from a communication kindly furnished us by an esteemed correspondent, will prove, we are confident, neither uninteresting nor un instructive. It will evince that his eminence was won not less by diligence in the pursuit of a useful and laborious profession than by the graces of his personal character; not less by his unwavering adhesion to principle and duty, than by the flexibility with which he knew how to adapt himself to all the classes of men with whom his varied life brought him into contact.

He was a descendant in the direct line of a family of no little note in the annals of Scotland. But however famed for wisdom in council and valor in the field, the Seatons had for centuries been scarcely less distinguished for an unfaltering attachment to the royal house. Hence, when the government of the revolution of 1688 was finally established, Mr. Henry Seaton, with a number of other Scotch gentlemen, despairing of any retrieval of the fallen cause of the Stuarts, was led to cross the ocean and seek a new home and new fortunes on the hospitable soil of colonial Virginia. It was in King William county, Virginia, that William Winston Seaton, a lineal descendant of Henry Seaton, first saw the light, January 11, 1785. His mother bore the name of Winston, a family originally from Yorkshire, in England, but long settled in Virginia, where it has always enjoyed great social consideration and influence. Mr. Seaton's early training was under the roof of his father, Mr. Augustine Seaton, at a time when the state of society may be said to have been peculiarly conducive to the formation of habits of self-reliance, independent thought, and a scrupulous regard for the feelings of others. To the love of study he added the love of the chase, a taste which accompanied him through life, and which, exacting robust exercise and steadiness of aim, seemed to have left its impress on his figure and action when he had reached the age of more than fourscore years. In the days to which we now refer, schools and colleges were not always at hand; books were not strewn broadcast through the country; the library, which existed as an heirloom of some old family, was such as they had brought with them from the Old World, received only rare accessions, and afforded none of those helps to easy knowledge which have perhaps extenuated our mental culture in the same proportion that they have extended it. If any special source of the love of letters, the refined taste, and varied acquirements which so highly distinguished Mr. Seaton might be pointed out, perhaps it would be found in the influence exerted on his opening mind by a Scotch gentleman then living as a refugee in Virginia, the well known Ogilvie, earl of Finlater, of whom few persons living at that day had not something to tell, as well respecting his eccentricities as his diversified accomplishments. But the mind on which these various influences acted was in itself well disposed for vigorous and independent exertion. At the early age of seventeen young Seaton was already prepared to enter on the business of life, and having adopted political journalism as his future pursuit, he gave it his constant services to the close; with how high and just a reputation for editorial equity, skilful management, and fulness of information, is well known to all who have been observers of the public events of our time.

After acting for some time as assistant editor of a Richmond paper, he passed, not without the prestige of early developed talent and force of character, to the sole management of the Petersburg Republican, and subsequently to that of the North Carolina Journal, of Halifax. Both Virginia and "the Old North State" were then peculiarly agitated by the passions and turbulence of political partisanship; the position of editor was not only environed with difficulties, but attended with danger. Mr. Seaton, with a diffidence which was always charac-

teristic, had at first hesitated to accept a post on which so much depended for his party, but every one who knew him will believe that when he had consented to lead the attack on the stronghold of federalism at Halifax, he brought to the service precisely those qualities which were requisite for its success—firmness of purpose, consistency of principle, courtesy to opponents, fairness as well as force in discussion. It is claimed for him in fact that mainly through his well directed exertions the reign of federalism was subverted in that part of the State where he labored, and the ascendancy fully transferred to those rules of constitutional construction which were then known alike by the name of *democratic* and *republican*.

We next find Mr. Seaton, scarcely twenty years of age, established at Raleigh, and associated with Joseph Gales, senior, in the editorship of the Register, the most influential journal of the State. It was in the family of Mr. Gales that two incidents bearing with the most important results on the future career and welfare of Mr. Seaton occurred. It was here that he met with the late Joseph Gales, junior, son of the former, with whom he was destined to maintain in the sequel an editorial connection of nearly fifty years, a connection which has inseparably associated their names, and whose fruits, as embodied in the columns of the National Intelligencer, will ever constitute an invaluable monument of the history and policy of their times. It was in the bosom of the same family also that the crowning happiness of his life was realized, in his union with Miss Sarah Gales, daughter of his editorial chief, and sister, therefore, of his future associate. "To refrain on this occasion from drawing aside for a moment the veil which covers the sanctity of domestic life, would be to omit the most interesting and graceful chapter of Mr. Seaton's personal history. His union with the honored partner of his life was marked by a mutual tenderness so seldom paralleled, by a devotion so chivalrous on the one part, a reliance so trustful and unhesitating on the other, that it must ever be referred to as the crown and complement of his earthly existence. The loveliness and good report of this conjugal example were treasured, it may be said, as a personal pride and possession by the community in which, for fifty-four years, the virtues, the talents, the ineffable grace of true womanhood, as exhibited in the person of Mrs. Seaton, sustained and cheered the toils of her husband in his arduous career."

In the mean time, Joseph Gales the younger had been forming himself, under the skilful guidance of his father, for the duties of a profession in which he was destined to attain an eminence that few have approached, and eventually became the proprietor of the National Intelligencer, then established at Washington. In this enterprise he was subsequently joined by his brother-in-law, Mr. Seaton, nor at the time of his accession did their united talents want for occupation in the exasperated state of party feeling and the imperilled condition of the country. It was in 1812, and hostilities had already been declared against Great Britain. Without entering into the questions which then convulsed the public mind, it is sufficient to say that the Intelligencer gave its earnest and able support to the party which regarded the declaration of war necessary to maintain

the power and secure the rights of the United States. In this state of things it was not likely that either of our editors would confine his efforts in behalf of the cause he had espoused to the labors of the pen and press; they were both members of volunteer corps, and shared in the expeditions which were organized, from time to time, to repress the predatory incursions of the enemy. But the labors of the pen and press were, in their case, felt to be of too much national importance to be dispensed with, and a furlough granted alternately to one and the other editor, provided for the uninterrupted appearance of the sheet to which the public chiefly looked for authentic information and the vindication of governmental measures. Mr. Seaton was at the editorial post on the morning of the memorable 24th of August, 1814, when the report of the distant gun told too surely that the enemy was advancing in force on the ill-prepared metropolis. Hastily despatching his workmen to their respective corps, Mr. Seaton himself hurried to the front and arrived in time to take part in the sharp initiative conflict which preceded the disasters brought on the American arms by incapacity or want of concert on the part of the leaders and the consequent disorganization of an untrained and badly armed militia. The rout of Bladensburg led the enemy directly into the city, and the results of the occupation, as regards the destruction of the public buildings, are matters of familiar history. It is not perhaps so generally known that a singular attestation was, at the same time, unintentionally afforded by Admiral Cockburn to the widespread fame and commanding influence of the *National Intelligencer*. He caused the office of its publication to be sacked and its valuable contents to be destroyed; too many incitations to patriotic effort had issued from that sanctuary to escape an ignoble vengeance.

It has been seen that the course of Mr. Seaton's life, from a period little advanced beyond boyhood, was such as to insure, indeed to necessitate, an intimate familiarity with the men and events of his time, with all changes of public opinion, with all discussions of constitutional law, with all the movements of interest, prejudice and affection by which the affairs of the world are governed. The thoughts, the passions, the motives of his fellow-men were necessarily with him subjects of scrutinizing observation and intelligent reflection. When he removed to Washington the sphere of his observation and influence was of course greatly widened. The trusted friend and counsellor of the earlier administrations, there can be no doubt that, as he was the depositary of their confidence, he often contributed in no small degree to shape their measures. The intimate and honored associate afterwards of such men as Adams, Webster, Clay, Calhoun, Berrien, and all the eminent statesmen of the past age, he could scarcely fail, with his quick and penetrating intelligence, to gain such insight into public affairs and to gather such stores of varied information as are rarely within reach of a single mind. To him, therefore, would naturally resort politicians and statesmen of every cast; for it was instinctively felt that in consultation with him there was a candor which knew no disguise, a courtesy which never failed, a fulness of information and clearness of judgment which his intrinsic goodness of heart placed at the service of all who needed them. The

same would be the case with the representatives of foreign governments, and with all enlightened strangers, and thus his influence was often propagated to other countries than his own. But this subject has been so graphically, if quaintly, touched by a contemporary journalist that we cannot do better than use his words: "There is a parlor in Colonel Seaton's old house at Washington," says this writer, "which, could its walls speak, would be more eloquent than the walls of any other apartment in America. In that well-known room it was not uncommon—we should rather say it was for years a weekly custom—for the greatest men in the country, and the representatives of other nations, to gather in the freedom of social intercourse. And this may be said with undoubted truth, that in those free social conversations and exchanges of thought were born many of the great measures of government which added lustre to the American name, so that that room may be regarded as the birthplace of much of our national glory."

After having filled successive municipal offices, Mr. Seaton, in 1840, yielded to solicitations which had been often resisted, and accepted from the citizens of Washington the dignity of the mayoralty, the highest which, under the public law, it has ever been in their power to confer. During the succeeding ten years, in which he was uninterruptedly recalled with unprecedented unanimity to preside over the affairs of the city, it is superfluous to say that he brought to the discharge of his duties a fidelity and energy which distinguished him in all situations, and which have stamped his administration as a model worthy of imitation by all civic dignitaries. It would seem indeed to have rested only with himself to fill the office to perpetuity, for when, at the end of the above period, he peremptorily declined a re-election on the score of advancing years, his retirement was regarded by all with undissembled regret. Nor is this matter of surprise; for if, in the unswerving discharge of duty, he had evinced an impartiality and firmness worthy of honor, he had still more won the popular heart by personal qualities which appealed to the sensibilities of all the good and all the suffering. Accessible to all classes, listening with patient sympathy to the story of need or wrong, which was ever promptly relieved or redressed, tenderly considerate of the humble and poor, his charity a household word wherever he was known, he called forth a respect and love not accorded to the many, and at last descended to the grave crowned by the blessings of those to whom the withdrawal of his earthly presence seemed little less than a domestic calamity.

One point only in Mr. Seaton's municipal administration is it thought needful here to particularize; his persistent efforts in the establishment of the present admirable system of public schools in Washington. A just tribute to his important work in behalf of education has been thus rendered by a municipal colleague: "When Mr. Seaton entered upon the duties of the mayoralty there were only two public schools in the city; but justly estimating the value of a new and improved system, he continued from year to year to press the subject on the attention of the legislative branches of the government, until it was adopted in the fourth year of his administration, from which time the number

of schools has increased until their scholars now amount to twice as many thousands as there were hundreds at the time of his inauguration. Among the many beneficent acts of his official life this will stand pre-eminent; and among the many friends in whose hearts his memory will be longest cherished, there will be thousands who, but for his efforts, would have been denied the blessings of education, and the manifold benefits resulting from that mental and moral culture which the children of all classes of our fellow-citizens have since enjoyed by means of the liberal and enlightened system he so opportunely introduced and established."

This rapid sketch would be culpably deficient did we not endeavor to convey some idea of the rare personal gifts and virtues of Mr. Seaton, in the sphere where they naturally shone with a more benign lustre—his home; and this we prefer to do in the words of one who knew and loved him well: "The centre of all household thought; obeyed by his inferiors with a service of love recalling a patriarchal age; it was at home, in the daily amenities of domestic and social life, that he was supreme. Who can forget Mr. Seaton as host? In the gatherings about his generous board mingled the cordial welcome and that air of an older and better school which constantly distinguished him—the kindly and reassuring attention, unaffectedly bestowed on the least distinguished guest, the colloquial charm, which extended the fame of his hospitality far beyond the sphere of its exercise. His conversation was indeed of an exalted character, lighted up by a quaint humor and ready wit, enriched with varied and solid information derived alike from men and books, marked also by originality of thought, by an utter absence of self-assertion or dogmatism, by a delicate tact in shielding others from the wound which a thoughtless or unkind word might inflict, and in drawing forth to the best advantage the talents and attainments of each. Doubtless, no unimportant part of the charm exercised by Mr. Seaton resided in his engaging presence—in the winning smile, the bright eye, the gentle voice, the benignity of a countenance upon which a long life of manly effort and kindly purpose had left its impress. In recalling these characteristics some idea may be conveyed of an attractiveness which was not only widely recognized among ourselves, but acknowledged by foreigners, especially the diplomatic representatives of other governments, solicitous of obtaining from his lips an explanation of our involved politics and those views of public measures which have been known on several noted occasions to have materially influenced the deliberations of foreign cabinets and determined their international policy."

We know not how we can better close this account of the life and character of a lamented colleague than by quoting the following passage from a discourse delivered on the occasion of his death: "One of the finest intellects of this country, and of the most devout, almost austere, evangelical faith, has repeatedly said, 'that of all the men he had ever known Mr. Seaton was nearest perfection and most ready to enter God's presence.' One of the texts on which the deceased sometimes dwelt as being to him exceedingly suggestive was, 'As a man *thinketh* so is he;' and this might be termed the key-note to his own character; without guile, trusting all, believing in all, his wide mantle

of charity and love covering all creeds, all humanity, his was truly 'the spirit which thinketh no evil.' One of his most striking characteristics was the indomitable courage which, through life and to its extremest verge, led him to brave difficulties and adversities with the same calm, unflinching decision with which he confronted personal danger, and which enabled him to endure, with unsurpassed fortitude, the sufferings of mortal illness. Self-reliant, self-poised, upheld by his consciousness of right and just endeavor, firm in his grasp of the immutable principles of truth, and in his reliance upon a gracious and superintending Providence, his life was guided by a sense of responsibility as a free moral agent, from whom a strict account of the talents committed to his charge was hereafter to be exacted. He was constant and fervent in prayer. Often, months before, and during his illness, his voice was heard in the stillness of night raised in petition to God. His last words on earth, the last tones of his voice vibrated with the name of the Saviour. He was a 'devout Christian; exalted honor his instinct, Christianity his guide.'"

The first of these is the fact that the United States is a young nation. It is only about 150 years old, and its history is therefore a history of growth and development. The second is the fact that the United States is a large nation. It covers a vast area of land, and its population is one of the largest in the world. The third is the fact that the United States is a diverse nation. It is made up of many different peoples, races, and religions, and this diversity has been one of its strengths.

The fourth is the fact that the United States is a nation of immigrants. It has been built by people from many different parts of the world, and this has helped to create a unique American culture. The fifth is the fact that the United States is a nation of pioneers. It has a long history of exploration and discovery, and this has helped to shape its identity as a nation.

The sixth is the fact that the United States is a nation of freedom. It has a long history of fighting for freedom and democracy, and this has helped to make it a leader in the world. The seventh is the fact that the United States is a nation of opportunity. It has a long history of providing a place where people can come and build a better life for themselves.

GENERAL APPENDIX

TO THE

REPORT FOR 1866.

The object of this appendix is to illustrate the operations of the institution by reports of lectures and extracts from correspondence, as well as to furnish information of a character suited especially to the meteorological observers and other persons interested in the promotion of knowledge.

MEMOIR
OF
MAGENDIE.

BY M. FLOURENS, PERPETUAL SECRETARY OF THE FRENCH ACADEMY OF SCIENCES.

TRANSLATED FOR THE SMITHSONIAN INSTITUTION BY C. A. ALEXANDER.

"WHEN one has otherwise a great deal of merit," says Fontenelle, "a general conformity with other men is an added merit." In the truth or value of this maxim the eminent academician of whom I am about to speak was so far from acquiescing that, in speculation as well as practice, he was generally prone to assert a perhaps undue independence of the opinions and contempt for the observances of others.

Of a spirit firm but sceptical, upright but aggressive, if his quick penetration enabled him to discover truth, if he knew how to exhibit it with simplicity and clearness, he was just as capable of putting forth a rough energy in combating it whenever it did not come to him of its own accord. We might imagine him armed with the lantern of Diogenes, and concentrating its light to see only the results which he himself obtained; results, indeed, which elucidate one of the most delicate points in the human organism, and will insure the duration of a name for which he has earned honor and consideration. That name had been transmitted to him by a surgeon, originally of Béarn, who exercised his profession at Bordeaux when François Magendie was born, October 15, 1783. In the case of this infant, the pious solicitude, the tender affection which nature reserves for the first stage of life, were sadly abridged; he was deprived, by an acute malady, of his mother, almost before he could know the happiness of being loved by one.

To the pleasing unconcern and confidence of infancy succeeded a precocious and rude apprenticeship. Transplanted, as early as 1792, to Paris, he heard nothing spoken of but the superlative work of *Social Regeneration*. His father, a man of upright purpose, but incapable of allowing a folly to pass without taking his share in it, conceived that, in order to endow his son with a civic energy corresponding to the elevation of his own principles, it was necessary to educate him according to the precepts delivered by Jean Jacques. The new Emilius, left to his own devices, wandered at will, with a liberty which strongly resembled absolute abandonment. In order to preserve him from instructions which might warp his judgment, he was left, on a principle of education, in complete ignorance. His only resource as regarded the world of intelligence was observation, which alone (so said his guide) could secure to him entire *independence*.

Finding, perhaps with reason, less difficulty in reforming abuses than in combating maladies, the enthusiastic patriot had abandoned a practice which annoyed him for the more congenial pursuit of unproductive civic appointments. With the practice went the comforts of the household; but what imported such a sacrifice as this? The exaggeration of patriotism and the reality of discomfort proceeded to such lengths that he would have constrained his pupil, while seeking to persuade him that this would be a further step towards independence, to make

his own shoes. At this point, the good sense of the young man revolted; he protested against all these follies; declared that he preferred to be dependent and well-shod, and concluded by asking to be sent to school.

The primary school had no pupil more ardent; admitted late, and endowed with an energetic will, the young Magendie quickly outstripped all competitors. His father was not at all shocked at the inequality which his son found the means of establishing from the first; but very generously pardoned him for it, and clapped his hands at hearing the great prize adjudged to this neophyte of fourteen years for an exercise "*On the knowledge of the rights of man and the Constitution.*" The *Journal des Hommes Libres* soon afterwards announced "that there was still hope for the most tender age, when the corrupting poisons of the reaction had not blasted it in its first bloom, since the son of citizen Magendie, municipal officer, elector, member of the commune, &c., having met with a child who was weeping and dared not appear in the presence of his father, had comforted, encouraged, and carried him back to the bosom of his family," a tender asylum which had often been wanting to this extemporized protector himself. A prize of *virtue*, ostentatiously awarded on this occasion, completed the glorification of the young republican. It was with reference to this incident that, in later life, M. Magendie, when the *liberty* was taken by any one of protesting against the too real asperities of his *temper*, would pleasantly reply that before his fifteenth year he had obtained the proud triumph just spoken of under the regime of *equality*, which must not be supposed to mean *equality of temper*; but that few certainly could boast of so precocious a virtue as himself.

According to the nearly constant practice of those who preach liberty, the father of M. Magendie reserved the exclusive use of it for himself. He announced to his son that, not to derogate from the family dignity, he must prepare to invest himself with the robe and bonnet of the doctor. It had been well if at the same time he could have inculcated the unhesitating faith and placid self-importance, essential qualifications, from which the acute and discriminating genius of the young man was soon to claim perpetual dispensation.

Introduced into the hospitals, the future adept there commenced his studies. The judicious Boyer chose him for his prosector, and in a few months this prosector transformed himself into a professor of anatomy.* Having obtained by competition the position of house-surgeon, (*interne*,) at the age of eighteen M. Magendie was competent to his own support. He distributed his time into three parts: the larger share was devoted to study;† a second portion was reserved for instruction, which, practiced from the outset, extended to all that he himself had learned, and formed at once the delight and resource of his youth;‡ then, poor but self-reliant, although the impressions received from his father had imbued him with a republican roughness, yet by a sort of instinct, the lively and last spark of the social distinction of his mother, he loved and courted the refinements of good society; aristocratic and culpable refinements, which however educate the character, mould the taste and invigorate the intellect; these had for him something of the prestige of forbidden fruit. A third part of his time, therefore, was consecrated to the intercourse of those saloons which, after the revolutionary tempest, had opened at the first return of tranquillity, and in which,

* It was about this time that he contracted his intimacy with Dr. Ferrus, who is known for his ingenious investigations and just views regarding the maladies of the mind.

† With his medical he combined literary studies. Although he had been reared at an epoch when it was the custom to swear only by Athens and Rome, when habits, manners, and principles were all borrowed from those two republics, he had been taught nothing of the ancient languages. Desirous of supplying this deficiency, he found the means of doing so through the excellent courses of M. Lemare which were attended also by some of his most distinguished cotemporaries. He always felicitated himself in after life for having had courage for this undertaking.

‡ He thereby formed a talent which was peculiarly his own, that, namely, of teaching forthwith whatever he had learned, and at the moment of learning it. This communicated an indelible stamp to his instructions, which was particularly pleasing to the young.

through a memory of the common calamity, all were friends. Here he was received as a young man of elegance and worth, and here he dissembled, with truly Roman stoicism, the distresses of his situation. "Yet," as he himself would jocosely say in after times, "during a period which seemed no short one, there remained for me, all deductions made, not more than five sous a day to live upon; and still I had a dog. We shared with one another; and if he was not fat, neither was I."

This energetic labor, this patient poverty, this aspiration for distinction, fortify and elevate the spirit. Honor to the poor student who sustains them! If, with his scanty appointments, in his bare apartment, he cheers his vigils and animates his ceaseless labors by a dream of success and glory, he does not deceive himself; it is at this price that they are purchased.

M. Magendie became assistant, and then prosecutor to the Faculty. This scholastic apprenticeship opened for him a career; his dexterity as an anatomist, his coolness, his hardihood, gave presage of a superior surgeon. But the life of compelled fellowship, of equality reduced to practice, the contact of rivalships never divested of means of offence, proved an intolerable ordeal for this austere and imperious nature. From this ordeal sprang an invincible repugnance to all acknowledged competition, and in order to escape this contingency he renounced surgery.

To find in this world a path where one's elbows shall be free is no easy matter. Our difficult youth brooded with so melancholy a spirit over the obstacles before him that his retreat was invaded by that bitter discouragement which long suffering entails, and which the youth, especially the young physician, never fails to attribute to some malady, assumed to be incurable, but which invariably vanishes before a gleam of good fortune. Magendie wished no longer to live; in fact he asserted that he could not. But one morning a man of the law presents himself at the asylum of the student, who, having neither process nor business, asks with natural surprise, what was wanted with him? "Nothing," replied the stranger, "that can be disagreeable to you. You have become the heir of a sum of twenty thousand francs, and I am here to place it at your disposal."

The invalid found himself at once in a state of convalescence. Accepting this unexpected supply as but a temporary remission of the severity of his life, he immediately made arrangements for the acquisition of showy horses and sportive dogs, all placed in the care of a sprightly and fashionable groom, who was charged, besides, with the duty of keeping a light equipage always in readiness for the use of the improvident but joyous owner of these superfluities. And that not a moment of this transient prosperity might be lost, and at the same time no encroachment be allowed on his conscientious studies, the whole of this apparatus of luxury was lodged as near as possible to the hospital. "Thither," said M. Magendie afterwards, "I used to run when I had an instant to spare, so that my whole recreation was literally centred in the stable." The twenty thousand francs were, of course, soon spent, but a little relaxation does much good; it had renewed the elasticity of his spirit.

Independence, the golden dream of youth, seemed to withdraw itself for M. Magendie within a circle which left him no choice but to be a physician, if *in spite of himself*. Such he was in effect, but he indemnified himself by maintaining a state of permanent revolt by obstinately refusing to yield his faith and homage to what he called *the grand idol of human credulity*. This conflict, in which he displayed infinite address and good sense, discovers to us the sceptic disentangling from prejudices the art which he respects, and thus giving himself the right to make his acquisition a somewhat costly one to the profession—a profession which must still honor the superiority of his views and the austere probity of his character.

The physicians of antiquity, beginning with Hippocrates, were at once phy-

sicians, surgeons, and apothecaries. "In the sequel," says Fontenelle, "the physician was divided into three; not, however, that one of the ancients was worth three of modern times." *Three* might suffice for the days of Fontenelle; at present it would be necessary to divide into four. Under a vigorous impulse, which is not yet spent, a new science had established its right of naturalization in our schools. Physiology, full of promise, lending itself readily to doubt and controversy, captivated the enterprising genius of Magendie, and opened for him a path to independent distinction.

"We anatomists," said the old academician, Mery, "are like the porters of Paris, who know all the streets, even to the smallest and most obscure, but who know nothing of what is passing within the dwellings." Physiology is precisely the knowledge of what is passing within the human dwelling.

The study of the forces by which life is nourished and maintained was cultivated in antiquity only by Galen, whose genius cast upon it some admirable gleams of intelligence. A long silence followed; more philosophic than practical, more inquisitive than indispensable, at least in the beaten routine of human culture, this science was transmitted without progress to modern times. In the seventeenth century, an English physician, guided by some confused lights derived from a school of Italy, and protected by an enlightened sovereign, ventured, in spite of popular prejudice, to practice upon living animals experiments which had become indispensable for the solution of the problem he had proposed for investigation. In this way Harvey detected the secret mechanism by which heat and life are maintained in the animal organism, and demonstrated the circulation of the blood. This discovery was a catastrophe for our old Faculties,* accustomed to enjoy in peace all the sweets of time-honored ignorance; they protested, they conspired, but in vain; the day of their ascendancy was at an end.

From the identical school in which Rabelais had taken his degrees before going forth to scourge fools and false knowledge with the lash of his caustic genius, proceeded, in 1648, a young man who, applying himself to persistent research, succeeded, like Harvey, in demonstrating a grand phenomenon, the course of the chyle, thereby completing the explanation of our vivifying forces. The admirable discovery of Pecquet has scarcely availed, however, to save his name from oblivion.†

Expelled by the vindictive thunders of our medical councils, physiology fled for refuge to a German university, to Göttingen. There, under the inspiration of Haller, was opened a series of delicate and profound investigations.‡ ascending from the study of the organs to that of the springs by which they are set in action, a progression which leads to the loftiest summits of philosophy.

At length appeared, at the commencement of the present century, the daring genius for whom was reserved the distinguished mission of popularizing phys-

* See my work entitled *Histoire de la Decouverte de la Circulation du Sang*. Paris, 1857, (second edition.)

† No eulogy of Pecquet has been read in our academy. Astruc barely names him in his *Histoire de la Faculté de Médecine de Montpellier*; and I have nowhere been able to find the date of his birth. Condorcet, in his *Liste des Membres de l'Ancienne Académie*, contents himself with saying: "He made in his youth, while at Montpellier, the discovery of the thoracic duct and of the reservoir of the chyle." Now, Pecquet did not make the discovery of the thoracic duct, made nearly a century before by Eustachius. He made that of the reservoir of the chyle. He traced—and this was the capital point—all the lacteal or chyloferous vessels (which Aselli, who had discovered them, still supposed to proceed to the liver) to that reservoir, by that reservoir to the thoracic duct, and by the thoracic duct to the heart, thus changing the whole doctrine on the course of the chyle. (See my *Histoire de la Decouverte de la Circulation du Sang*.) Sprengel very properly says: "Certainly the discovery of Pecquet shines not less in the history of our art than the truth for the first time demonstrated by Harvey." (*Histoire de la Médecine*.) The truth would be, the discovery of Pecquet yields, in physiology, only to that of Harvey.

‡ The experimental analysis of the vital forces begins with the two fine memoirs of Haller on *sensibility* and on *irritability*. (See my work entitled *De la Vie et de l'Intelligence*, second part, p. 69.)

iology in France. Bichat combined with the experimental method of Haller bold and judicious views, drawn from a source where prejudice had been accustomed to look only for style; he threw into technical language the ideas of Buffon;* invested them with the forms of the school, and supported them by anatomical demonstrations. By the energetic cast of his genius Bichat swayed his cotemporaries to the study of a science for which his own ardor extended even to the sacrifice of his life. One of his school-fellows, Le Gallois, died also in the same task; but invested neither with the prestige of easy eloquence, nor with the facilities of success afforded by comradeship, this modest precursor of modern studies on the nervous system obtained from renown nothing but the scantiest justice.†

Le Gallois was still living when M. Magendie presented himself in the arena as a champion of undoubted pretensions. In his own person a strange but favorable result of a training conducted on the principles of Jean Jacques, completed by the severest teachings of our first republic, he had proceeded to frame for himself a code of duties; a code which did not save him from the eccentricity of manifesting by turns the most inflexible selfishness and admirable disinterestedness; a rigid probity in the statement of his own labors, a culpable injustice or contempt for those of others; a hard and intolerant humor towards every one who seemed to stand in his way; a kindness and generosity without bounds for the feeble or afflicted.

It was by criticism that M. Magendie first made himself known.‡ In 1808 he reproached Bichat with having abandoned himself to hypotheses, and declares that, for his own part, he shall admit no facts which do not find their confirmation in experiments competent for himself to repeat. In 1809 he presented to the Academy of Sciences a memoir on one of the most important phenomena of the animal economy, that of *absorption*. If an active substance, a poison or virus, is introduced into any part of the body, that substance is immediately absorbed—that is to say, is carried from the more superficial parts to the deeper and more essential. By what organs is this transfer effected? Is it by the veins, or by the lymphatic vessels? Haller thought that it was by the former; John Hunter, by the latter; other physiologists hesitated. By a bold experiment, M. Magendie suppresses the lymphatic vessels;§ he leaves only the veins;

* See, as regards the obligations of Bichat to Buffon, my work, *De la Vie, &c.*, part second, p. 17 et seq.

† See the work of Gallois entitled *Expériences sur la Principe de la Vie, notamment sur Celui des Mouvements du Cœur et sur le Siège de ce Principe*. Paris, 1812. It is from this book, a conscientious and profound labor, that dates, in France, the physiological study of the nervous system.

‡ See his memoir entitled *Quelques Idées Générales sur les Phénomènes particuliers aux Corps vivants*, (*Bulletin des Sciences Médicales*, 1809, p. 145.) M. Bernard, the distinguished disciple and friend of M. Magendie, has given a good summary of his little tract, which is essentially but a criticism of the *vital properties* of Bichat. "Why invent," asks M. Magendie, "on occasion of each phenomenon of living bodies, a particular and special vital force? Might we not content ourselves with a single force which we should call *vital force* in a general manner, in admitting that it gives rise to different phenomena according to the structure of the organs and tissues which operate under its influence? But is not even this single vital function too much? Is there not here a simple hypothesis, since we cannot detect it? It would be of greater advantage if physiology only commenced at the instant when the phenomena of living bodies become appreciable by our senses." (*Notice sur M. Magendie; Leçon d'Ouverture du Cours de Médecine au Collège de France*, 1856, p. 7.)

§ "M. Delille and I separated from the body the thigh of a dog previously comatized with opium; we left untouched only the crural artery and vein, which preserved the communication between the thigh and the trunk. These two vessels were dissected with the greatest care; their cellular tunic was removed, for fear that it might contain some lymphatic vessels. Two grains of a very subtle poison (*upas ticuté*) were then injected into the paw; the effects of this poison were as prompt and intense as if the thigh had not been separated from the body. It might be objected that, in spite of all the precautions taken, the walls of the crural artery and vein still contained lymphatics, and that these vessels sufficed to give

he even substitutes for the veins a *quill*, since the walls of the veins might possibly still contain some lymphatic branches; absorption takes place as rapidly as usual, and thus absorption by the veins is demonstrated.

At all times there have been useful dissidents who have seemed charged with the function of keeping our learned corporations awake. Such an one, among the predecessors of Magendie, was the physician Chirac, who had heretofore maintained before the assembled faculty that the stomach remains inactive in *vomiting*. Death had overtaken Chirac before he could conclusively verify the fact. So favorable an opportunity could not escape M. Magendie; he proved, by a decisive experiment, that Chirac was right, and that in the act of vomiting the stomach does in fact remain inactive.*

In a multiplied series of labors,† one of the most ingenious is that which he made public, in 1817, on the *elasticity* of the arteries. Doubts were still entertained respecting the precise faculty by which the arteries co-operate in the movement of the blood. By some it was maintained that they were *irritable* or *contractile* like the muscles; by others that they were altogether *passive*. M. Magendie proved that they are active, but in a manner which is peculiar to

passage to the poison. In order to remove this difficulty, I repeated on another dog the preceding experiment, with this modification, that I introduced into the crural artery a small quill, on which I secured this vessel by two ligatures; the artery was then cut circularly between the two ligatures; the same thing was done for the crural vein: by this means there was no longer communication between the thigh and the rest of the body, if not by the arterial blood which flowed to the thigh and the venous which returned to the trunk. The poison, afterwards introduced into the paw, produced its effects in the usual time—that is, at the end of about four minutes.” (Magendie, *Precis Elementaire de Physiologie*, t. II, p. 265, third edition.)

* “It had been long thought that vomiting depended on the sudden and convulsive contraction of the stomach; but I have shown that this viscus is nearly passive in the act, and that the true agents in vomiting are, on the one hand, the diaphragm, and, on the other, the large muscles of the abdomen; I have even succeeded in producing it when, in a living dog, I substituted for the stomach the bladder of a hog which I afterwards filled with a colored liquid.” (Magendie, *Precis Elem. de Physiologie*, t. II, p. 154.)

† It will not be out of place to give here a summary account of a few among the numerous works of Magendie not alluded to in the text.—*Memoire sur l'usage de l'epiglottide dans la deglutition*, 1813. From the experiments of this memoir, the author concludes: 1st, that the epiglottis is not indispensable to the integrity of deglutition; 2dly, that it is especially the movement by which the glottis is closed that guards the larynx during the passage of aliments swallowed.—*Memoire sur les images qui se forment au fond de l'œil et sur un moyen tres-simple de les apercevoir*, 1813. This means consists in making use, for the examination of the images formed at the bottom of the eye, of the eyes of *albino* animals, (rabbits, pigeons, &c.,) in which the sclerotic coat is transparent.—*De l'influence de l'emetique sur l'homme et les animaux*, 1813.—*Memoire sur l'oesophage et ses fonctions*, 1813.—*Memoire sur la deglutition de l'air atmospherique*, 1813. These three memoirs complete the *Memoire sur le vomissement*.—*Memoire sur les propriétés nutritives des substances qui ne contiennent pas d'azote*, 1816. The result of this investigation is that substances which do not contain azote (sugar, gum, &c.) are improper for nutrition. Although the animals submitted to experiment were allowed these substances at discretion, and even consumed much of them, they did not the less certainly die of *inanition* at the end of some days. Still further, it is shown that whatever the aliments employed, whether azotized or not, it is necessary to vary them. “A rabbit and a Guinea pig, nourished with a single substance, such as wheat, oats, barley, cabbage, carrots, &c., die, says M. Magendie, with all the appearances of inanition, usually in a fortnight, but sometimes much sooner. Nourished with the same substances given concurrently, or successively at short intervals, these animals live and thrive. The most general and essential consequence to be deduced from these facts is that diversity of aliments is a most important rule of hygiene.” (*Precis element. de physiologie*, t. II, p. 504, 505.)—*Recherches physiologiques et medicales sur les symptomes et le traitement de la gravelle*, 1818. “The persons attacked by gout and gravel,” says M. Magendie, “are ordinarily great eaters of flesh, fish, cheese and other substances abounding in azote, (nitrogen.) Most of the urinary gravels, a part of the urinary calculi, arthritic tophus, are formed by uric acid—a principle which contains much azote. By diminishing in the regimen the proportion of azotized aliments, we succeed in preventing and even curing gout and gravel.” (*Precis element. de physiologie*, t. II, p. 503.)—*Recherches physiques et physiologiques sur l'ipécacuanha*, 1816. The result of these researches, made in common with M. Pelletier, was the discovery of the active principle of ipécacuanha or *emetine*.

them.* Their action depends on their *elasticity*, an elasticity which is very decided, but yet purely physical. The first object of experiments in physiology is the *distinction of forces*; M. Magendie already recognized this great aim, and attains it here by a skilful discrimination. The circulation of the blood commences through the *contractility* of the heart, a vital force, and is continued through the *elasticity* of the arteries, a physical force.

It is well known by how profound an aversion for all conjecture, by how exact an observation of facts, the researches of M. de Laplace were marked, and how much they contributed to maintain in the academy the severe spirit of the experimental method. Laplace desired that all science should be but an assemblage of facts rigorously concatenated; and after having, according to the felicitous expression of M. Cuvier, *subjected the heavens to geometry*, he did not despair probably of establishing the same order of things upon earth. The decisive and absolute manner in which the young physiologist was accustomed to draw his conclusions, not always safe, however, from subsequent retraction, appeared to Laplace well suited to the style of a geometer. And if it be an essential quality of the latter to yield deference to no one, few certainly could, in this respect, be better qualified for the function than our colleague.

M. Magendie, confident in his own strength, held himself aloof with a disdainful pride, eluding every ordinary encouragement. But it came to pass that one day the illustrious, the rigid, the judicious Marquis de Laplace volunteered the first advances towards him. Electricity is less potent, for this acts not on the spirit, than are the few words of encouragement which fall from the lips of a great man. Our sceptic thought himself secure from all enthusiasm, and was only the more hurried away by it. It was not long after this that M. de Laplace said to his old friend M. de Montyon: "It is greatly to be regretted that learned

* The conclusions at which he arrived are: "1st, that the arteries, great and small, present no trace of *irritability*." This we now know to be too absolute; the arteries, especially the small ones, are *irritable*. This does not hinder, however, their function in the circulation from being principally due, as Magendie says, to their *elasticity*—to the elasticity of their *middle membrane*, their *yellow tissue*. "2dly, that the contraction of the left ventricle and the *elasticity* of the arteries supply a sufficient mechanical reason for the movement of the blood in these vessels." (Magendie, *Journal de physiologie experimentale*, t. I, p. 114.)

Long afterwards, in one of his best lectures at the college of France, he recurred to the part borne by the *elasticity* of the arteries in the circulation, and with a development well worth remarking: "The part which elasticity bears in the great act of circulation is too important not to detain us for a moment. The heart—a central organ which may be compared to an hydraulic pump—is intended to force continually, but by alternating impulsions, blood into the system of tubes, which goes on subdividing itself, and constitutes what we call arteries. These become reduced into extremely slender ducts which, under the name of capillary vessels, proceed to inosculate with another system of tubes—the veins—which convey the blood back from the periphery to the common centre whence it flowed. Such, on a large scale, is the phenomenon of circulation. It is readily conceived that the contraction of the left ventricle may be sufficiently energetic to drive the liquid into the arterial system, but is its action propagated even into the capillary and venous conduits? This problem must now be resolved in the affirmative." [See on this point the researches of M. Poiseuille, one of his pupils, whom Magendie regarded as doing him most honor.] "A first phenomenon is this: the heart, each time that it contracts, throws into the arterial system a wave of blood, and as each contraction is alternate, it follows that the blood must be projected by interrupted jets. This consequence is plain; yet observe now what passes in the vessels where it circulates. If we open an artery near the heart the blood escapes in distinct jets; if the vessel is distant from the heart the flow is uniform and continuous; and if we open finally one of the small arterial ramifications which form the capillary net-work, the blood spreads itself uniformly in a sheet. How comes it that an alternating pressure, like that of the contraction of the ventricle, can in the end produce a continuous efflux? By what process of nature is this remarkable result accomplished? By the elasticity of the walls of the arterial vessels. If I be not mistaken, I was myself the first to insist on this wholly mechanical explanation, the only one which renders an exact account of this singular phenomenon. In effect, the jet of blood which the ventricle projects into the aorta makes itself felt in all the arteries whose walls it distends; the impulsion ceases, but the sanguineous current is not on that account interrupted, for these walls contract upon themselves in virtue of their elastic property, and exert on the contained liquid an energetic compression." (*Leçons sur les phénomènes physiques de la vie*, t. I, p. 171–183.)

bodies have not at their disposal the means of sustaining the zeal of inquirers who have established themselves in the right method of procedure; the young Magendie, for instance, who gives to physiological labors the invariable basis of experiment, would deserve to be encouraged." "Are not your own exhortations the most powerful of encouragements?" "They are not sufficient," replied Laplace; "for those who aspire to reach our academies there should be graduated approaches, which would consist in competitions and prizes." "Yours, then," rejoined the unostentatious benefactor, "be all the honor of the conception: dispose of whatever you think necessary; I desire for myself nothing more than to have satisfied one of your enlightened wishes." The prize of experimental physiology was thereupon established, and on Magendie was conferred the first distinction.*

His reputation attracted numerous auditors to the courses which he had long before opened. In experimenting before them, he initiated them in his researches, brought into play their sagacious curiosity, inspired them with the pleasure of refutation. Truth was what he sought with all his energy; to attain it, no surer means, he held, could be found than to borrow nothing from either ancients or moderns. Starting with the principle which he had established for himself, that in science everything was to be reconstructed, he called everything in question, allowing nothing to stand but what was capable of resisting his incessant controversy.

The novelty of this instruction had its charms for the young; but the professor was reproached for the sacrifices to which it condemned him. He held, however, the transient sufferings of the victim a consideration of little moment in view of the high and useful aim, the welfare of his species. As the practitioner, to save a life, hesitates not to provoke a pain, so M. Magendie's persistence in experimenting on the living animal was no proof of want of sensibility. Let us remember that he shared with his dog when he had but five sous to live on, and judge whether it is likely that he would be needlessly cruel.

In 1816 M. Magendie had published an *Elementary Compend of Physiology*.† The science which, a century before, was only accessible to a few savants, is, in this work, condensed and definitely circumscribed, so as to present to youth a lucid and practical manual. In 1820 he founded a *Journal of Physiology*, which, in a duration of ten years, collected the labors of diligent inquirers, promoted the progress of the science, and extended the reputation of its editor.

About this time, impelled by an insatiable curiosity of observing and of knowing all that was being done in analogy with his own researches, he crossed the channel. His presence in London was scarcely known before he was called upon, at the solicitation of the principal physiologists whom the country of Harvey then numbered, to repeat, with a skill which seemed to pertain to prodigy, the experiments by which he was enabled at will to suspend, accelerate, or reduce the forces of life.‡ So ardent was the admiration excited that it

* In 1814, M. Magendie, who had been twice before designated by the conscription, was again summoned. On this occasion the academy interposed; in view of his prospective services, it requested his exemption, which was accorded by a special decree. "You owe this favor," wrote the minister, "to the success which you have achieved in the sciences."

† The date of the first edition was 1816; of the fourth and last, 1836.

‡ "I was in the laboratory of Wollaston, engaged in repeating before this illustrious observer some of my experiments on the nervous system. He was especially desirous of verifying by his own inspection the effects of the section of the fifth pair. I opened the cavernous sinus or carotid artery, and a profuse hemorrhage ensued around the brain. The animal was at once seized with convulsive trembling, and fell as if dead. Wollaston considered it to be so, and requested me to repeat the experiment on another. I would prefer to recall this one to life, said I, and, what is more, cause it to run as far as you please. He thought that I was jesting. I then cut a certain point of the brain, and the animal darted off like an arrow. Wollaston, of a spirit as judicious as exact, and habituated to reflection, was vividly struck with the certainty and novelty of these results." (*Leçons sur le système nerveux*, t. I, p. 198.)

gave rise to a counter-party. A prudish memorial was even laid before the House of Commons, denunciatory of "this stranger whose offensive temerity had broken through all the humanitarian barriers established by English zoophilism."

The institute had been the supreme ambition of M. Magendie; to reach it he had combined both efforts and studies. It was a distinction which suited his instincts of independence, of recognized superiority, of noble disinterestedness; not so the free test of the ballot; this suited him very little. The decisive day having arrived, two of his pupils were commissioned to bring him news of the result, which he awaited at home with lively anxiety. At length one of his confidants hurries to him with tidings of his success. "This," he exclaimed, "repays all my labor; my object in life is attained!"

From this epoch dates the special application of M. Magendie to the study of the nervous system. "The inner man," said Van Helmont, "is all nerve"—*Homo interior totus nervus*. It is, in effect, through the nervous system that man feels, moves, wills, perceives, that he has intellectual life; all other parts exist only for the service and support of this system.

"If we admire," said, two centuries ago, the great anatomist Stenon,* "the artifice of the fibres in each muscle, how much more must we admire it in the brain, where these fibres, included in so small a space, perform each its operation without confusion and without disorder!" Stenon was right. What strikes us most in the nervous system is the marvellous *artifice* with which all is there arranged. The fibres, springing from the brain, in their prolongation form the spinal marrow; in detaching themselves, by distinct fascicles, from each side of the trunk, they furnish successively all the nerves of the body; twenty times they become associated, as often separated; some run parallel with, others cross one another; all is united and all distinct; everything touches, and nothing is confounded; each fibre preserves its special play, its proper function; nowhere is there disorder; and from the most intimate connection of the constituent elements of the organ results the free exercise of all the faculties. How abysmal a depth! and, in man himself, what subject more worthy of the meditations of man!

Hence the first and perhaps the most ingenious, the most inventive of physiologists, Galen, seems to have concentrated for this great study all that he possessed of penetration, of ardor, of critical discrimination. He blames Hippocrates for having confounded the *nerves* with the tendons; Aristotle for having taken the *heart* as the origin of the *nerves*, an error which he seems to impute to him as a crime, (*crimini dandum*.) Aristotle had founded his opinion of the *heart*, thus assumed to be the origin of the *nerves*, on the appearance of certain parts. "But how long, oh, excellent Aristotle," exclaims Galen, "has it been the rule to judge of the parts by their appearance? It is by their uses, their properties, their functions, and by these alone, that we must judge of them." Galen was the first to distinguish clearly the nerves from the tendons; the first to see the true origin of the nerves; it was he who first proposed the problem of the separate loss of *sensation* and of *movement*:† a fundamental problem which it was reserved for our own age to propound anew and to solve.

* I quote the entire passage: "We are sure that wherever there are fibres in the body, they maintain a certain correspondence with one another. If the substance of the brain be everywhere fibrous, as in effect it appears to be in several parts, it must needs be admitted that the disposition of these fibres is arranged with great art, since the diversity of all our sensations and all our movements depends on them. We admire the artifice of the fibres in each muscle; how much more must we admire it in the brain, where these fibres, enclosed in so small a space, perform each its own operation without confusion and without disorder!" *Discours sur l'Anatomie du Cerveau, lu par M. Stenon dans une assemblée chez M. Thévenot, en 1668.*

† *Ubi vero pars aliqua convulsa est, &c.* "When any part is convulsed, it must needs be that the nerve appropriated for its movement, or the muscle, is affected. Hence if we found our practice on the anatomy of the nerves, proceeding to the several parts, we shall more successfully treat their loss, whether of sense or of motion. These, however, were not dis-

In 1811 an English physiologist, a man of profound sagacity, after having long meditated on this vast network of nerves, whose complication seems *inextricable*, published a pamphlet of a few pages, in which, according to his own expression, *he submitted to his friends* his views and ideas.

The principle with which everything in this tractate connects itself is, that whenever two or more nerves proceed to the same part, it is not for the purpose of repeating, of reduplicating therein the same action, but to indue it respectively with a different function. For example, two nerves proceed to the face; the one is for the voluntary movement, the other for the respiratory movement. The tongue receives three nerves: one for the movement of deglutition, another for the voluntary movement, a third for the sense of taste. Each nerve, therefore, has its determinate office, its precise mission. But it remained to clear up a point still more difficult. The greater part of the nerves, all those, for instance, of the spinal marrow, are at the same time motive and sensitive. Now, how can this be? How shall two functions coexist in a single organ? It was at this point that, by an inspiration of genius, C. Bell conceived the idea of the duality of each nerve, each being composed of two, the one for *sensation*, the other for *movement*; in this we have the explanation why each nerve has two *roots*, and in each *root*, taken separately, is seen the primitive, the simple, the distinct nerve. M. Bell, therefore, submits each root to experiment; he obtains, as regards one of the two, a clear and precise result, and from the property manifested by this one he infers the property which resides in the other.

This experiment, an ever-memorable though incomplete one, was the first step. Ten years later, M. Magendie read to the Academy a memoir, in which he announced that having divided the *anterior root* of a nerve he had abolished only *movement*, and that having divided the *posterior root* he had abolished only *sensation*. In this he had simply completed the experiment of M. Bell, but this completion was in itself a new and important advance; for here nothing was left to deduction, but all was positive; the experimental demonstration was perfect. It seems that, in England, all the import of the discovery to which the name of Bell had been first attached, was only comprehended when it became known there how much admiration was excited on this side of the channel by the subtle investigations of Magendie.

The impression produced by the rare sagacity of our dexterous experimentalist was still in the ascendant when he himself, by one of those abrupt changes to which he was but too subject, gave a complete denial to his previous results. On this occasion the vacillation was not without excuse; in an inquiry so delicate, the further the exploration was carried the more complex became the enigma.

M. Magendie, an experimentalist far more practiced than M. Bell, could not multiply his researches without perceiving that the root recognized as *motive*, that is to say, the *anterior* one, yielded signs of *sensibility*. Whence did it derive that sensibility? Unsparing towards himself, fully as much as towards others, M. Magendie passed twenty years of his life in seeking the solution of this new problem; and we may say to-day, to the honor of his memory, and before this Academy which so greatly applauded it, that he found that solution.

criminated by Herophilus and Eudemus, the first, after Hippocrates, who accurately described the anatomy of the nerves, and who thus have left no slight occasion of perplexity to physicians in regard to the fact that, through palsy of the nerves, sometimes the sense only, sometimes the motion, and sometimes both together, are abolished. Wherefore, when motion is lost, this we mostly call palsy (*resolutio*) of the nerves; but where the sense of certain parts has perished, we are accustomed to say rather that such part is devoid of sensation, although there are some who call this affection a palsy of the sense. We leave to each, however, to apply these names at his pleasure. Physicians lose sight of the fact that the nerves distributed through the skin of the hand, and by which the faculty of sensation is conveyed to it, have their appropriate roots, and that there are other roots of the nerves by which the muscles are put in motion." Galen, *De Loc. Affect.* p. 21, *apud Juntas*, Venice 1597.

The sensibility of the *anterior* root, of the *motive* root, pertains not to that root, is not its own, is in fact but a derivative from the *posterior* root. This *derived* or *reversionary* sensibility, which M. Magendie afterward denominated *recurrent* sensibility, constitutes his discovery. And by this discovery, so delicate and so difficult to achieve, he has restored to the principle of *exclusiveness of action* all its purity, for he has shown that, considered apart and in itself, the *anterior* root is solely *motive*, as the *posterior* root is solely *sensitive*. As long as M. Magendie lived these striking results were contested; nay, they are still contested, but they are not the less incontestable. The recognition which contemporaries evade, is compensated by the admiration of posterity.

M. Magendie was admitted to the Institute in 1821. Having had sufficient address to secure his acceptance without dissembling his original humor, without subjecting his ineradicable spirit of sarcasm to constraint, he was quite sure to discard neither the one nor the other when he had attained his object. His colleagues—the practitioners—had admitted him into their Academy from its foundation, inasmuch as till then he had shown himself a sufficiently respectful disciple of Hippocrates, although he believed in nothing, and in medicine less than anything else. With a future conspiring to that end, convictions might have reached him; but a future like his, embellished by the sympathies which his scientific success assured him, could but conduct this intractable associate to open revolt.

In our own ranks he fulfilled conscientiously the duties imposed on him; in the labor of the committees he showed himself as active as he was judicious and clear-sighted; several reports of his were real studies. But he held in reserve, at the service of certain of his privileges, those abrupt sallies whose suddenness disconcerted prevision and set at naught all academic tradition. He never insinuated that an opinion was erroneous or a fact misstated; he plainly said so. When a professional colleague—a physician—aspired to the Institute, his suffrage was, of course, to be solicited; but unless the impulses of affection tended that way, he defended the position as one who did not believe in the necessity of sharing it, and opposed to the foibles of the candidate a frankness which left nothing to be guessed at. When substantial titles to success appealed to his probity, he would content himself with saying, as he turned away: “Well, well! you shall have my voice, but not my hand.”

A still more serious danger beset our academician: having dedicated himself without reserve to physiology, he had arrogated that department of science to himself as a domain which belonged to him in his own right. No point of it could be touched upon without arousing his jealousy: either he had treated of it, or he held it mentally in reserve with a view to inquiring what new aspect could be given to it by experiment. In this state of things an aspirant who stepped from the ranks became an enemy. Transported beyond all self-possession, M. Magendie would on such occasions reappear before us as the man who had been reared in a complete exercise of the privileges of democracy, until reflection and the intrinsic probity of his character admonished him how much, by such injustice, he had descended below his proper level.

Sarcastic, self-confident, and intellectual, there was here more than enough to insure a good position in the world. Accordingly a select body of patients awaited him without his seeking; but it was necessary that these patients should renounce the comfort of being consoled for imaginary complaints; that, conformed to his humor, they should accept plain truths, and submit to reprimands and caprices. In spite of all, as Sganarelle expresses it, “they were so bewitched with an idea of the man’s skill,” that, on the noise of the reputation which they created for him, he was sometimes approached by those unhesitating advocates of medical infallibility who venerate the yoke and would think all was lost if their faith did not increase in proportion to the obscurity of the doctrine. In laying before such persons the scanty inventory of his own creed, M. Ma-

gendie would throw their frankness into ludicrous perplexity, and finish by assuring them that all they needed was to be cured of their tendency to credulity.

To the ardor of young practitioners vaunting the success of their prescriptions he opposed his own experience, saying to them with pleasant irony: "It is plainly to be seen that you have never tried the plan of doing nothing." If the extreme simplicity of this mode of treatment elicited not unreasonable objections, "Be assured," he would add, "that, for the most part, when disturbance manifests itself, we cannot discover the causes; we can, at most, only verify the effects. Our usefulness, in presence of the efforts of nature, which, in general, tends to the normal condition, consists in not interrupting them; it is only now and then that we can aspire to be sufficiently skilful to aid them."

On a certain occasion, when quitting a young person whose condition presented alarming symptoms, he said: "Let him do just what he pleases; that is all I prescribe." Usually sparing of his time and visits, in behalf of this child he lavishes both, but adds nothing to his medication. On the evening of the third day, all at once his brow clears up, and, taking the invalid by the ear, he exclaims: "Little rogue, you have not allowed me a moment's rest; go now and walk about." The delighted father asks: "What, then, was the matter with the child?" "What was the matter? upon my word I don't know; neither I, nor the whole faculty, if they were sincere, could tell you; what is certain is, that everything has returned to its normal state." And with this he disappeared.

The greater portion of the medical career of M. Magendie was devoted to the unfortunate; he preferred the hospital to other practice. Twenty years of service as physician in the wards showed us this rigid and wayward man, gentle and patient on approaching the bedside of the indigent; the earnest thinker, the inflexible censor listening to and consoling the poor women of the Salpêtrière; receiving with emotion the humble testimonial which they offered him; and not quitting that establishment for the Hôtel-Dieu, in 1830, without stipulating for himself the right of continuing to extend to the former his disinterested benefactions.

A chair of medicine having become vacant at the College of France, the minister, desirous of reconciling public opinion with the tendencies of the government, thought proper to require some concessions from the rigid candidate whom that opinion indicated. Conducted by a friend to M. Frayssinous, and surprised at having allowed himself to be thus entrapped, the strange candidate maintained so stately and formal a reserve, that the eloquent minister—a great master in point of *conferences*—saw this one come to an end without having produced any relaxation of the jealous rigidity of his interlocutor. On retiring, our humorist shook his head and remarked: *He is not yet strong enough for me.* M. Recamier received the nomination.

Three years later, in 1800, M. Magendie was put in possession of the chair. It was then that he gave free course to his ardor for experimental art, and it is surprising to what an extent he lavished his experiments. Yet for this who can justly blame him? It was from these extemporized experiments that often sprung the boldest and most happy results. He had the gift of seizing phenomena in passing, and, as it were, on the wing. Endowed with keen curiosity, prompt and impulsive by nature, improvisation was of the essence of his genius.

The success of hap-hazard experiments, however, is not art. Art demands, first of all, combination, reflection. It is not the experiment which investigates: it is the mind which investigates through the experiment; it is the mind which discovers, which invents the means by which the discovery is made. Buffon has said with a profound sense: "The best crucible is the understanding."

The lessons of M. Magendie at the College of France have been collected in two separate works: one on the *Nervous System*; the other on the *Physical Phenomena of Life*. The latter presents the professor under a new aspect.

Bichat had exaggerated the part played by the *vital properties*; M. Magendie exaggerates, in turn, the part played by the *physical properties*.* Their opposition has rendered both more useful; it is only by multiplying special points of view that we arrive at a view of the whole.

Through a profound alliance, which forms the *nodus* of life, everything in our organism concurs: the *physical forces* like the *vital*. And even these two orders of forces do not represent the man in his completeness; above the *vital* forces preside the *psychical* or *intellectual* forces. *Sensibility* is not a *physical* force, nor is *thought* a *vital* force.

As there is a superior philosophy, so there are commodious philosophies. I call commodious—and without allusion to M. Magendie, who belonged to none†—all philosophy which breaks its subject to pieces and takes a fragment for the whole. The superior and true philosophy embraces the complex being, and, in that complex being, arrives at unity, not by the arbitrary exclusion of such or such parts, but by a clear and distinct view of the precise function of each.

M. Magendie would, for his part, have said with Pascal, though with less profound meaning: "We do not think the whole of philosophy worth an hour's trouble." His vocation did not lie therein, but was that of a great experimentalist. Having received from Bichat the torch of experimental art, he bore it with a steady hand for forty years; indefatigable in labor, bold in exploration, making no account of any sect, neither of *materialism* nor of *vitalism*, incapable of the spirit of sectarism, he sought truth with entire independence. This emancipated reason of his was his distinctive stamp, securing him the esteem

* One of the points, of this kind, in which he has indulged the greatest exaggeration, is that which regards *absorption*; this he reduces to *imbibition*; but even here the exaggeration consists rather in the expressions than in the fundamental idea. He calls absorption a *wholly physical phenomenon*, and in this he is mistaken; there is but one thing purely *physical* about it, namely, the *imbibition*.

He very properly says: "Now, we all know that every substance, whether acid or alkaline, wholesome or deleterious, is absorbed as soon as it is placed in contact with our tissues. There is herein nothing but a phenomenon of imbibition, and all that has been said of the intelligence of the pores is only a romance at present out of date." What he adds touching the different functions of the *veins* and *lymphatic vessels* in *absorption* is also very just: "No doubt the lymphatic vessels can absorb, since their walls, like those of the veins, are porous and susceptible of being imbibed with the liquids with which they happen to be in contact. Recall now the division which we have established in the mechanism of absorption. We there see two phenomena entirely distinct: on one hand, a local imbibition of the liquid; on the other, a transfer of the liquid imbibed into the current of the circulation. The former property is common to the two orders of vessels; but, as regards the second, do we find united in each the conditions necessary for its being effected? I have satisfied myself that, in most circumstances, the lymphatic vessels are not filled with liquid, nor traversed by an interior current; hence, most frequently they are not, they cannot be agents of absorption. The veins, on the contrary, destined to convey without cessation the blood from the periphery to the centre, must, by just right, be considered as the habitual channels by which the liquids are absorbed." (*Leçons sur les phénom. physiq. de la vie*, t. I.)

† It is very true that he would willingly have explained everything by *physical forces*, if he could; but he clearly distinguished in the living organism the *physical* from the *vital*. And who could confound them? The art is in separating them. "Begin always," he says, "by analyzing the phenomena, by isolating what is physical from what is vital." (*Leçons sur le syst. nerv.*, I, p. 4.) "I distinguish, in vitality, two great classes of phenomena: the one comprises *physical phenomena*, the other *vital phenomena*." (*Leç. sur les phén. phys. de la vie*, t. II, p. 14.) "Far be it from me," he further says, "to exaggerate the importance of physical explanations. Thus, why is it that, under the influence of a moral emotion, more or less vivid, we see the face redden or grow pale? There is here something peculiar, something which belongs not to the domain of physics." (*Ibid.*, t. I, p. 202.) Elsewhere he says: "To seek to explain a physical phenomenon by vital laws, only because that phenomenon occurs in a living body, is an idea quite as irrational as to speak of vitality in reference to an inorganic body." (*Leç. sur le syst. nerv.*, I, p. 3.) Finally, his conclusion thereupon is that "Physical laws lose nothing of their authority for being exercised in organized bodies. Observers only have been wanting to follow them into this living world, this microcosm of the ancients. Each function, each organ would easily furnish us the proof of it; and is it not, of itself, exhibited in the senses, the movements, the voice, the circulation of the blood, &c.?" (*Leç. sur les phén. phys. de la vie*, t. I, p. 310.)

of thinkers, who know how little intellectual partisanship is worth, and the sympathy of the young, who delight to owe their convictions only to themselves.

"Men passe," says the philosophic Bacon, "and knowledge is increased;" *multi pertransibunt et augebitur scientia*. Haller, Bichat, Magendie, had scarcely constituted physiology, properly so called, the human physiology, when a much wider horizon was disclosed. Thanks to comparative anatomy, that antique study restored to our age, the view of the physiologist has been enabled to embrace the total assemblage of living beings. To observation, to experiment, it has become possible to add the art, not less subtle and prolific, of uninterrupted comparisons; comparisons have brought to view relations; relations have guided us to laws. "Laws," says Montesquieu, "are the necessary relations of things."

A new philosophic spirit, born of science and superior to science itself, propounds all the great questions of life, no longer studied only in each particular being, but considered as a constituent element of the universe: its origin, its antiquity, its gradations, its successive variations; it is a spirit which shrinks not from disentangling, from following up the profound relations which connect the history of life with the history of the globe; it sees the globe and life developed by a common evolution; concerted progress reveals the unity of design; and to recall an eloquent phrase of the Roman orator, "it almost lays hold upon Him who governs and controls everything—*ipsum cuncta moderantem et regentem penè prehenderit*."

Towards the commencement of 1832 the ordinary course of M. Magendie's life was turned aside. Vague and ill-boding reports were spread abroad, nor was the phantom, though distant at first, slow in disengaging itself from its shadows and presenting to our excited imaginations the assurance of a coming pestilence. Then, when under the pressure of fear personal susceptibilities had become acute even to cruelty, the noblest of purposes formed itself in the mind of our colleague. Coming one day to our ordinary session he said to us: "I am a physician, and that vocation summons me to the focus of the evil. I go to Sunderland; hoping that I shall be able to bring you thence, by studying the cholera in the place of its appearance, some useful indications! Invest me, by delegation from your body, with more authority." Everywhere he was received with interest and respect. Having reached the seaport, the centre of contagion, he is informed that in a population of fishermen scattered along the neighboring coast had occurred the outbreak of the disease. Proceeding directly thither he finds collections of individuals exposed under miserable huts to all the rigors of humidity, uncleanness, and vice, living, sleeping, eating between the dead and the dying, and with instincts so brutal as to forbid the hope of any helpful intervention.*

Ordinary contagion was not an admissible theory. When anxiously asked, on his return, "What is it? what shall we do?" the only answer which could be drawn from him in his dejection was: "I do not clearly know."

Paris was still throbbing under the dread presentiment when the pestilence, clearing the interval at a single bound, burst upon us like an explosion. Who does not remember that at the outbreak, the extreme violence of which had till then been unexampled on our continent, a man stricken was a man dead? Summoned on the first attack, from that moment M. Magendie was no longer at his own disposal; it was towards the hospital that he directed his steps. "The rich," he said, "will not want for physicians;" and traversing the ranks of a deluded and infuriated crowd from which issued the cry: "Vengeance, death to the physicians, death to the poisoners!" he ascended the steps of the Hôtel Dieu, renewing his self-forgetfulness on a thousand occasions in behalf of

* He was accompanied in this expedition by M. Natalis Guillot, at present one of the most distinguished members of our Faculty.

wretches reduced to the state of an inert mass, feeling no pain but that of inspiring distrust, and finding his recompense in the liberality with which his purse was emptied for the succor of such as were saved and restored to their families.

The duration, the rigor of the pestilence found the forces of M. Magendie at their own level. Calm having been somewhat re-established, the cross of the legion of honor was sent to him. "I think it very well awarded," he remarked.

Having satisfied his conscience, he returned to his labors, occupied himself anew with inquiries respecting the nervous system, resumed his instruction; but his lectures on the cholera, and still more his bearing, evinced that this man, who was accused of insensibility, had not passed with impunity through an interval of heart-rending emotions. Impelled by a secret preoccupation, he applied himself to an investigation of the agents under the influence of which epidemic maladies may be generated.

Being shut up one day in his laboratory, he was giving his whole attention to an experiment, when lifting his eyes they met those of a sedate and portly personage who, in abrupt tones, asked to speak with Magendie. From the first glance at the broad-brimmed hat scrupulously kept on the head, the short breeches, the peculiar cut of the vesture, the experimenter comprehended the quality of his visitor. "I had heard speak of thee," said the Quaker, "and was not misinformed; I come to say to thee that thou shouldst desist from these experiments. Who has permitted thee to dispose of the life of these animals?" "Your countryman Harvey," replied M. Magendie, "would not have discovered the circulation of the blood if he could not have sacrificed the deer in the park of Charles I. Here science contends against the maladies inflicted on humanity, as elsewhere war contends against the incursions of barbarism. Perhaps," he added with complaisant deference, "you would condemn the chase." "Certainly," replied the inflexible Quaker; "I condemn the chase, I condemn war, and experiments upon animals; man therein assumes rights which do not belong to him: I mean to prove it, and I shall travel until I have made those wrongs disappear from the world." Probably this reformer is still on his travels.

A sojourn in the country came very opportunely to diversify our savant's course of life. Under the influence of a smoother existence this heretofore unmanageable nature was led to unbend itself. He had married; he saw that he was understood even in the foibles of his character, and, like a man of sense, took the part of laughing at them. "I agree," he said resignedly, "that I am nothing but a real bull-dog." Happy days were ushered in by this frankness; friendly neighbors came around him to applaud his experiments on vegetation, on agricultural ameliorations, attempts which, he said, might enrich science and the country, but whose immediate result was to diminish his own fortune. To fire-side happiness, to the charms of a lively society, he joined the pleasure of doing good. For the suffering in his neighborhood, dispensing with a part of his medical principles, he had established in his house a small, but very small pharmacy. Of all remedies that which he oftenest put in practice was to pay the invalid for the consultation which the invalid received.

No trace of the republican recklessness and rudeness remained, except perhaps in the malign pleasure which from time to time M. Magendie still allowed himself, of demolishing all our governments; and that with so hearty a denunciation that a judicious friend once said to him: "If to-day a government were created to your mind, in six weeks you would find it the most detestable in the world." "Very possibly," he replied. "It is certain, however, that not one of them can boast of having received a solicitation from me."

It was, in effect, without solicitation that in 1848, on the establishment of the consultative commission of public hygiene, he was nominated its president. The firmness with which he interdicted the admission of all charlatanism into this institution, the clearness and justness of his views, rendered his influence

there of great utility ; there, as everywhere else, he commanded general esteem, and more than elsewhere showed himself accessible to friendship. He had eight years before been called by the ministry of war to the presidency of the commission of hippiatric hygiene. Here the information which he conveyed became the source of ameliorations of which our cavalry still enjoys the benefit. In 1851 the cross of commander of the legion of honor was sent to him ; at this, however, he took umbrage, fearing that the services which he had rendered would thus lose the merit of disinterestedness.

A grave alteration which manifested itself in the health of M. Magendie revealed that one of the organs essential to life was attacked. Thenceforth he came but rarely to our meetings ; thenceforth there survived for us, in place of the capricious and difficult colleague, only the man of uncontested eminence. Nothing was remembered but that undeviating rectitude which gave so much strength to the personal attachments of which he was the object ; and when, still later, it was known that the malady had become more serious, devoted disciples, grateful pupils, relations, friends, colleagues felt a common alarm ; asperities were forgotten. It was said by Fontenelle of an academician of his time : "Those who might have had something to complain of in regard to his bluntness, all went to see him ; he was touched by the expression of sentiments which he had merited more than he had attracted." M. Magendie also received with cordiality and acknowledgment the expression of the sentiments he had merited. "Know," said he to his old competitors, "that my asperity increased in proportion to the worth which I recognized in those towards whom I exercised it." So ingenious is self-love that each found in this strange mode of appreciation wherewith to be satisfied.

It was impossible to enter the room of the invalid without being struck with the grief which impressed the countenance of a servant whom thirty years' contact had rendered the grotesque but faithful copy of his master ! Watching anxiously by his pillow this attendant heard him announce, with calmness, the hour of separation. "Courage, my good master," he exclaimed, carried away by a pious attachment, "courage, I beseech you ; we shall still grumble on together."

The moral force which this upright man had so studiously cultivated was respected by the malady. His sufferings did not distract him ; he studied them as phenomena. "You see me here completing my experiments," were his parting words to a colleague ; "never has the science to which I have devoted all my strength appeared to me environed with more grandeur ; the springs of life, so marvellously combined, are quickened in order to make of each of us an instrument of passage, which in perishing is regenerated. In my restricted course may I but have succeeded in planting some way-marks along the route which leads to TRUTH, the sole power to which I have subordinated my reason !"

M. Magendie died the 7th of October, 1855

APPENDIX I.

ON THE DISCOVERY OF THE DISTINCT FUNCTIONS OF THE ROOTS OF THE NERVES.

I.—M. Bell published, in 1811, a pamphlet, under the following title : *Idea of a New Anatomy of the Brain, submitted for the observations of his friends*. In this he first announces his ingenious idea that each nerve, which is both *motive* and *sensitive*, is a double nerve, and secondly describes his experiment. In regard to his idea of *double* nerves, or, as the author calls them, *mixed* nerves, he says : “ I have to offer reasons for believing that * * the nerves which we trace in the body are not single nerves possessing various powers, but bundles of different nerves, whose filaments are united for the convenience of distribution, but which are distinct in office as they are in their origin from the brain.” (Bell : *The Nervous System of the Human Body*, &c.; 3d edition, Edinburgh, 1836, p. 442.) He adds : “ Considering that the spinal nerves have a double root, and being of opinion that the properties of the nerves are derived from their connections with the parts of the brain, I thought that I had an opportunity of putting my opinion to the test of experiment, and of proving at the same time that nerves of different endowments were in the same cord and held together by the same sheath.” (*Ibid*, p. 443.) In stating his experiment, M. Bell says : “ On laying bare the roots of the spinal nerves, I found that I could cut across the posterior fasciculus of nerves which took its origin from the posterior portion of the spinal marrow without convulsing the muscles of the back ; but that on touching the anterior fasciculus with the point of the knife, the muscles of the back were immediately convulsed.” (*Ibid*, p. 443.)

We thus see what was done by Bell : first, it was he who first conceived that each nerve might be *double*, or composed of two ; secondly, it was he who, before all other physiologists, directed experiment to the *roots* of the nerves ; thirdly, from his experiment, however incomplete, he arrived at the conclusion of a distinct function for each root. All this was accomplished by M. Bell ten years before the researches of M. Magendie.

II.—The titles of Magendie to the important discovery are distributable into two series : by the first he completed the labors of Bell ; by the second he discovered the *recurrent sensibility*. I shall begin by reproducing entire the first “ Note ” of M. Magendie, and it will be seen how felicitous was his insight on this first attempt. His first introspection was in fact always the surest.

Experiments on the functions of the roots of the rachidian nerves, by M. Magendie ; 22d July, 1822 : “ I had long desired to make an experiment in cutting, in some animal, the posterior roots of the nerves which spring from the spinal marrow. I had several times attempted it without succeeding, on account of the difficulty of opening the vertebral canal without injuring the medulla, and consequently destroying or at least sorely wounding the animal. Last month, a litter of eight pups, six weeks old, was brought to my laboratory, and these seemed well suited for a renewal of the attempt to open the vertebral canal. In effect, I was able, by the use of a very sharp scalpel, and so to say at a single stroke, to lay bare the posterior half of the spinal marrow surrounded by its envelopes. To have this organ almost naked, it only remained for me to cut the *dura-mater* which encloses it, and this was done with facility ; I had then before my eyes the posterior roots of the lumbar and the sacral pairs, and by raising them successively with the blades of the small scissors I could cut them on one side, while the marrow remained untouched. I knew not what would be the result of this attempt ; but I reunited the wound by a suture of the skin and observed the animal. I at first thought the member corresponding to the nerves

entirely paralyzed; it was insensible to punctures and to the strongest pressure; it seemed also to be immovable. But presently, to my great surprise, I saw it move very apparently, although the sensibility was all the time wholly extinct. A second, a third experiment gave me exactly the same result; I began to regard it as probable that the posterior roots of the rachidian nerves might well have different functions from the anterior roots, and that they were more particularly destined for sensibility.

"It naturally occurred to my mind to cut the anterior roots, leaving the posterior ones undisturbed; but such an undertaking was more easy to conceive than to execute; how could it be possible to uncover the anterior part of the medulla without injuring the posterior roots? I confess that at first the thing appeared to me impracticable; yet for two days I never ceased thinking about it, and finally decided to attempt to pass before the posterior roots a sort of knife for cataract, whose very narrow blade would allow of cutting the roots by pressing them with the edge of the instrument on the posterior face of the body of the vertebræ; but I was obliged to renounce this expedient on account of the large veins which the canal contains on that side, and which were opened at every movement in advance. In making these essays, I perceived that by pulling upon the vertebral *dura mater* I could discern the anterior roots united in fascicles, just when they are about to penetrate that membrane. I wanted nothing more, and in a few moments I had cut all the pairs which I wished to divide. As in the preceding experiments, I made the section only on one side, in order to have a term of comparison. It may readily be conceived with what curiosity I followed the effects of this section, nor were they ambiguous; the member was completely motionless and lax, while it preserved a sensibility not at all equivocal. Finally, to neglect nothing, I have cut at once the anterior and posterior roots; there was then an absolute loss both of sensibility and movement.

"I have repeated and varied these experiments on several species of animals; the results just announced were confirmed in the most complete manner, whether as regards the anterior or posterior members. I am prosecuting the researches, and will give a more detailed account in the coming number; it suffices that at present I am enabled to assert that the anterior and posterior roots of the nerves which issue from the spinal marrow have different functions; that the posterior appear more particularly destined for sensibility, while the anterior seem more specially connected with movement."

Having seen the first note of M. Magendie, let us pass to the second; the retrograde step cannot fail to occasion surprise:

Note on the functions of the roots of the nerves which spring from the spinal marrow; October 22, 1822: "The facts which I announced in the preceding number are too important not to have led me to seek to elucidate them by new researches. I wished first to ascertain if the anterior or the posterior roots of the spinal nerves might not be cut without opening the great canal of the vertebral *dura mater*; for, by exposing the spinal marrow to the air and to a cold temperature, the nervous action is sensibly enfeebled, and consequently the results sought for are obtained in a manner but little apparent.

"The anatomical disposition of the parts rendered this not impossible, for each fasciculus of a spinal root proceeds for some time in a particular canal before uniting and being confounded with the other fasciculus. In effect, I have found that by means of scissors blunted at the point, enough of the films and lateral parts of the vertebra might be removed to expose to view the ganglion of each lumbar pair; and then with a small stylet the canal containing the posterior roots may be separated without any insurmountable difficulty, and there is no further impediment to the accomplishment of the section. This mode of making the experiment has yielded me the same results with those I had already observed; but as the experiment is much longer and more laborious than by

following the process in which the great canals of the spinal *dura mater* is opened, I do not think that this method of making the experiment should be pursued in preference to the former.

"I desired afterwards to submit to a particular proof the results of which I have previously spoken. Every one knows that the *nux vomica* causes in man and animals general and very violent convulsions. It was a matter of curiosity to know whether these convulsions would still take place in a member whose nerves of motion had been cut, and whether they would show themselves as strong as usual when the section of the nerves of sensation had been made. The result has proved altogether accordant with those preceding that is to say, that in an animal in which the posterior roots were cut, the tetanus was completed and as intense as if the spinal roots had been all intact; on the contrary, in an animal in which I had cut the nerves of movement of one of the posterior members, that member has remained supple and motionless at the moment when, under the influence of the poison, all the other muscles of the body underwent tetanic convulsions of the most decided kind.

"By directly irritating the nerves of sensation or the posterior spinal roots, would contractions be produced? Would direct irritation of the nerves of motion excite pain? Such are the questions which I proposed to myself, and which experiment alone could resolve.

"I commenced by examining under this aspect the posterior roots or nerves of sensation. What I have observed is this: on pinching, pulling, pricking these roots, the animal evinces pain, but not to be compared, for intensity, with that which is developed if the spinal marrow be touched, even lightly, at the place whence these roots spring. Nearly every time that the posterior roots are thus excited, contractions are produced in the muscles where the nerves are distributed; these contractions are, however, but slightly marked, and vastly more feeble than when the medulla itself is touched; when at the same time a fasciculus of the posterior roots is cut, a movement of the whole is produced in the member to which the fasciculus proceeds.

"The same trials were made upon the anterior fasciculi, and analogous results obtained, but in an inverse sense; for the contractions excited by pinching, pricking, &c., are very strong and even convulsive, while the signs of sensibility are scarcely visible. These facts, then, are confirmative of those which I have announced; only, they seem to establish that sensation resides not exclusively in the posterior roots, any more than movement in the anterior. Yet one difficulty may be raised. When, in the experiments which precede, the roots have been cut, they were continuous with the spinal marrow: might not the shock communicated to this be the real origin both of the contractions and of the pain experienced by the animals? To resolve this doubt, I have repeated the experiments after having separated the roots from the medulla, and would say that except in two animals in which I observed contractions when I pinched or pulled the anterior and posterior fasciculi, I perceived in all the other cases no sensible effect from the irritation of the anterior or posterior roots thus separated from the medulla.

"I had still another kind of test to which to submit the spinal roots: this was galvanism. I have, consequently, excited those parts by this means; first while leaving them in their ordinary state, and then by cutting them at their spinal extremity, so as to place them on an isolating body. In these different cases I have obtained contractions with the two kinds of roots, but the contractions which followed the excitation of the anterior roots were, in general, much stronger and more complete than those produced when the electric current was established by the posterior ones. The same phenomena took place whether the zinc or copper pole were applied on the nerve.

"It would now remain to render an account of the researches which I have made in attempting to follow the isolated sensation and movement beyond the

roots of the nerves—that is to say, in the spinal marrow ; with this I shall by and by be occupied. Before terminating this article I should offer some explanations respecting the novelty of the results which I have announced.

“When I wrote the note contained in the preceding number I believed myself the first to have thought of cutting the root of the spinal nerves ; but I was undeceived by a communication from M. Schaw, a young and studious physician, on receiving the last number of my journal. He informs me that M. Ch. Bell had made this section thirteen years before, and had ascertained that the section of the posterior roots did not prevent the movements from continuing. M. Schaw adds that M. Bell had recorded this result in a small pamphlet, printed solely for his friends, not for publication. Having requested of M. Schaw to send me this pamphlet, if possible, in order that I might render full justice to the author, I received it a few days after ; its title is, *Idea of a new anatomy of the brain, submitted for the observations of his friends, by Ch. Bell, F. A. S. E.* It is curious, certainly, to remark therein the germ of the recent discoveries of the author on the nervous system, and I transcribe entire the passage indicated by Dr. Schaw :

““Considering that the spinal nerves have a double root, and being of opinion that the properties of the nerves are derived from their connections with the parts of the brain, I thought that I had an opportunity of putting my opinion to the test of experiment, and of proving at the same time that nerves of different endowments were in the same cord and held together by the same sheath. On laying bare the roots of the spinal nerves I found that I could cut across the posterior fasciculus of nerves which took its origin from the posterior portion of the spinal marrow without convulsing the muscles of the back, but that on touching the anterior fasciculus with the point of the knife the muscles of the back were immediately convulsed.”

“It will be seen by this citation from a work which I could not know, since it was not made public, that M. Bell, guided by his ingenious ideas on the nervous system, very nearly arrived at a discovery of the functions of the spinal roots ; yet, the fact that the anterior are destined for motion, while the posterior pertain more particularly to sensation, appears to have escaped him ; it is to the having established this fact in a positive manner, therefore, that I must limit my pretensions.”

Reply of M. Bell to M. Magendie. For the convenience of the discussion M. Bell attributes this reply to a pupil, but this *pupil* may well have been M. Bell himself : *

“Although the original experiments (those, namely, of M. Bell) have much more value in all their results than those which have been reported by M. Magendie, yet it is noticeable that the latter, when he found himself compelled shortly after to abandon his pretensions to novelty, had the assurance to affirm that the experiments made by himself were the most careful. It was really amusing to see M. Magendie make a parade of superior exactness, when, in the same memoir, instead of persisting in his first decision, he changes in the most essential manner what he had established respecting the functions of the nerves in question. In this second publication on the subject, he gives a relation altogether different from that which he had offered in his previous memoir.

“The results derived by M. Magendie from his first experiments were altogether accordant with those which our author had announced in 1811. Consequently, when an account of them arrived in this country, and it was seen that he gave this discovery as original, measures were taken to make known to the

* I am indebted for the communication of this paper to M. Benjamin Brodie, a highly competent judge in the matter. M. Brodie knew M. Magendie well, and, in writing to me, justly places him not far from Haller and Bichat : from Haller, of whom he had not the erudition ; from Bichat, of whom he had not the *expansive* views ; but equal to both, and perhaps superior, for industry in the invention of experiments and skill in their execution.

profession to whom it was that the merit of the discovery really pertained. In this there was no difficulty; but M. Magendie having abandoned the opinions set forth in his first memoir, and adopted views diametrically opposite to those of Sir Ch. Bell, there was no further question of priority between them; the question then presented was not to determine who had first seen, but who had seen aright.*

"It is proper to say that if the views given by M. Magendie in his second memoir on the functions of the roots of the spinal nerves had been exact, they would have left us no hope of ameliorating our knowledge respecting the nervous system by reasonings founded on anatomy. The fundamental part of the original doctrine was that the nervous root yielding the sensation is altogether distinct from that which supplies movement;† that these properties are so different in their nature that they cannot both pertain to the same nerve; that when a nerve, in its passage, possesses at once movement and sensation, it is a sign that it is a double nerve, composed at its origin of two roots, one the source of sensation, the other the source of movement; that it is not reasonable to suppose that a nerve can conduct the nervous influence in two opposite directions at once, as would be necessary if a nerve transmitted at the same time the motive power and received the sensations. Now, what M. Magendie presents in his second memoir,‡ as being of such remarkable exactness, tends directly to overthrow all this. Each of the two roots, as he views it, can at the same time transmit movement and sensation; it is not true that the anterior root is exclusively for movement, and the posterior for sensation; the former partakes to a certain degree the function of the latter, and the latter that of the former; all that can be alleged respecting the distinction between the two roots is that the anterior has more influence as a nerve of movement than the posterior, and the posterior more influence as a nerve of sensation than the anterior; that the anterior may confer sensation, and the posterior movement," &c.

Remarks of M. Magendie on the occasion of a note of M. Flourens, March 1, 1847: "I must thank M. Flourens for having given before the academy the explanations which I asked of him in the preceding session. The greater part of the facts which he cites seem to me exact; only he interprets them in a manner which I cannot admit.

"And first, if I have maintained silence in the circumstance recalled by my colleague, no one is authorized to regard it as a sort of abandonment of my right; for the report made to the academy for the prize of physiology of 1841 says, in so many words, that I *had thought right to excuse myself as not competent to be judge and party in questions in which I was so much concerned*. I pass now to the researches of Ch. Bell.

"It was I who first made these researches known in France. I analyzed them in my *Journal de Physiologie*. I even signalized their originality at a public sitting of the Academy of Sciences; and if the discovery that is now sought to be attributed to the English physiologist had been announced, or even indicated in his memoirs, I had certainly not failed to give it the greatest prominence and to point out all its importance. He was himself well satisfied with the reception which I gave to his labors. The proof that he recognized my having rendered him full justice, is the fact that, the 10th of June, 1822, he

* All this is well enough said and very true, as long as abstraction is made of the *recurrent sensibility*, or the latter is not known, as was the case with M. Bell.

† Agreed: such is in effect of the fundamental part of the original doctrine—*exclusiveness of action*. But in truth there is something more; there is the *mobile sensibility* of the *anterior root*. M. Bell did not see it, but some physiologist would in the end have seen it, and so long as some physiologist, as skilful as M. Magendie, should not have discovered the character of *reversion*, of *derivation*, the fine principle of exclusiveness could not have been admissible.

‡ In this second memoir, M. Magendie is mistaken; but how fortunate the mistake (*felix culpa*) which leads us to the discovery of *recurrent sensibility*! (See further on what I say under the title of *Conclusion*.)

wrote in his journal: 'My discoveries have made more impression in France than here; I have received a second letter from Magendie, where he says that if I would send him a short analysis of my experiments, I would receive the medal decreed by the institute.' (*Biography of Sir Charles Bell, British Review*, October, 1846.) Whoever knows the susceptibility and jealous character of Charles Bell will readily agree that he would not have expressed himself in this manner regarding a stranger who had omitted in an appreciative account of his labors the finest of his discoveries.

"On the occasion of my first publications respecting the functions of the roots, M. Schaw wrote to me that Ch. Bell had formerly made some experiments analogous to mine. He sent me a small pamphlet, dated 1811, and which had been communicated only to the author's friends, with a view, as he said, to have their opinion touching his new but still undecided ideas on the anatomy of the brain. I lost no time in transcribing word for word, in my *Journal of Physiology*, the passages which had reference to the roots, and I took care to add that neither myself nor any one else in France had the least suspicion of the existence of this tract. Fortunately for my own researches, it contained nothing which touched upon the capital fact, the distinction, namely, between the two rachidian roots—these as nerves of sensation, those as nerves of movement.

"In effect, Ch. Bell, preoccupied with his ideas on irritability, simply says that in cutting *the posterior root, he had produced no contraction in the muscles, while the muscles were contracted when he touched with the point of the instrument the anterior root.* Such is the experiment as he describes it. We see that not only had he not distinguished the roots into sensitive and motive, but that even the word *sensibility* had not been pronounced. How could it be otherwise, since he operated only on animals recently dead?

"In fine, Ch. Bell had had before me, but without my knowledge, the idea of separately cutting the rachidian roots; he had also had the merit of discovering that the anterior influences the muscular contractility more than the posterior. As regards priority in this, I have, from the first, done him entire justice; but when the question relates to having established that these roots have distinct properties and functions—that the anterior preside over movement, and the posterior over sensation—this discovery I must claim as my own. Ch. Bell had not indicated, nor even caught a glimpse of it, since it in no wise results from the experiment which he relates. It is therefore my own work, and must remain as one of the columns of the monument reared by French physiology since the commencement of the present century."

Of recurrent sensibility.—The discovery of *recurrent sensibility* was the result of the second series of M. Magendie's researches. On this interesting subject, which he alone had yet ventured to attempt, the following is his first Note, (May 20, 1839,) containing the summary of his new experiments on the nervous system:

"The sensitive nerves and the rachidian motors are equally sensible when they are both intact.* If we cut the sensitive nerves, the motor nerves immediately lose their sensibility.† If the motor nerves are cut in the middle, the end which remains attached to the spinal marrow is wholly insensible; the opposite end preserves, on the contrary, an extreme sensibility.‡ In that case, the sensibility proceeds from the circumference to the centre.§ If the sensitive nerves be cut at their middle part, the end which attaches to the marrow is highly sensible; the end which attaches to the ganglion has, on the contrary, lost all sensibility."||

We come now to the last Note of M. Magendie on the recurrent sensibility, which is also the most important, June 28, 1847:

* An assured fact, if account be taken of the recurrent sensibility. † A real fact and wholly new. ‡ Again a fact, and still a new one. § Evidently. || *Comptes rendus de l'Académie des Sciences*, t. viii, p. 76.

"Scientific discoveries have very different destinies. Some, accepted with enthusiasm from their very origin, traverse the world, everywhere exciting admiration. So vast and facile is their success that we are tempted to assign them to that class of brilliant errors which spring up at periods only too frequent to satisfy an imperious necessity of the human mind, that, namely, of being deceived. Other discoveries remain in the obscurity in which they are produced, until some fortunate circumstance occurs to throw light upon them and confer renown on their authors. Others still, which at first enjoy a certain lustre, fail to surmount the ill-will of cotemporaries, and after having striven for recognition, eventually vanish and sink into oblivion, if they do not meet in time with some efficacious succor. A remark of some importance which I had the honor of presenting to the academy in 1839, and which may be regarded, I think, as a discovery, happens unfortunately to fall at this time within the last category.

"I shall not here recount its vicissitudes; I shall only say that it has been twice condemned by committees of the academy, since these committees have conferred a prize on two works in which my discovery is qualified as erroneous. Sustained by such respectable authority, it is the right of every one to think that I have labored under an illusion, (a thing in itself quite possible, for whoever investigates is liable to err.)

"Another ground may have existed for the same conclusion. I was a member of the two committees; I abstained from co-operating with them, as it was proper that I should; but it was in my power to have protested, and yet I have maintained a silence which has been doubtless construed as a tacit acknowledgment of my error, although, in truth, it had a wholly different signification. Probably my honorable colleagues acted on this occasion upon the maxim, *Amicus Plato, sed magis amica veritas*. I am myself a strong partisan of this wise maxim, and I have more than once put it in practice, taking care, however, to prefer to Plato nothing but truth.

"Why did my honorable colleagues not consult me? Why not ask to see my experiments, which I should have been only too ready to repeat before them? I can only explain it by a sentiment of benevolent discretion towards a colleague whose position might appear to them embarrassing. However this may be, to foreclose all discussion, I concede that those who have not seen my experiments might well regard my discovery as seriously compromised; for unfortunately the physiologists who have thought proper to reproduce them have done so in such a manner that it was impossible for them to verify the results. Yet the fact in question is one which I regard as opening a new way to experimental researches on the functions, still so obscure, of the nervous system. There rests, then, on me an obligation to recur to this point of physiology, and to put it in the power of every one to verify the exactness of the results which I made known in 1839.

"Let us first state in what consists the phenomenon which in the year just mentioned I denominated sensibility *en retour*, but which at present I think it preferable to call recurrent sensibility.

"If we lay bare, with suitable precautions, a pair of the rachidian nerves, we shall recognize that the two roots are *sensitive*, but that they are so by very different titles. In the posterior, the source of the sensibility is at the centre and diffuses itself to the circumference; in the anterior, on the contrary, the origin of the sensibility is at the periphery and is propagated towards the centre. It is for this reason that I give to the latter the name of recurrent sensibility.

"To prove that the sensibility of the anterior root really proceeds from the periphery, I divide it transversely towards the middle of its length, and of the two ends which result from its section, that at the periphery remains *sensitive*, while the central is *insensible*. To demonstrate that this sensibility of the anterior rachidian root is acquired and that it takes its source in the corresponding posterior root, I divide likewise this last, and instantly the anterior root loses all its

sensibility. Of the two ends which result from the section of this posterior root, that which adheres to the ganglion has become insensible, while that attached to the medulla still possesses an acute sensibility. Hence this root directly receives its sensibility from the spinal marrow.

"I shall dwell no further on these results, which are literally the same that I announced to the academy in 1839, and which I have demonstrated in my lectures at the College of France; I will only add that I maintain them to be rigorously exact, and that I am now, as then, always ready to exhibit them to those who signify a desire that I should do so. At present I proceed to report certain facts which are of a nature to throw new light on the phenomenon of the recurrent sensibility of the anterior roots.

"Differing in this from the posterior roots, which are constantly sensible, it sometimes happens that on interrogating the anterior root we find it deprived of sensibility. This is particularly observable when, the opening of the rachis and the separation of the root having been laborious, the animals are weakened by pain and loss of blood. But this insensibility is only temporary; it suffices to wait a few instants, and the phenomenon reappears and subsists as long as the state of the wound and of the enviroing parts allows of its being observed.

"This momentary disappearance of sensibility in the nerve is a very singular phenomenon which pertains to the recurrent sensibility, and which distinguishes it essentially from the direct sensibility of the posterior root, a sensibility which I have never known completely to disappear. When, however, the experiment is suitably made, we recognize immediately, on the opening of the rachis, the recurrent sensibility of the anterior root, and I have realized that, to succeed, the best process is that in which the spinal marrow is laid bare only on one side and to the extent of one or two vertebræ. I have moreover remarked that, when the experiment has been as well performed as possible, if the animal has lost a certain quantity of blood, the phenomenon is not manifested; and I add that, at the moment when it is most apparent, it may be made to disappear by the operation of blood-letting.

"In my first experiments, before I knew the influence of the causes just pointed out, it had happened that I had found the anterior roots sometimes sensible, sometimes insensible. This result, which might then have appeared contradictory, is, however, but the rigorous expression of the facts, and depends on that remarkable peculiarity, that a sensitive nerve may, under certain influences, temporarily lose its sensibility and afterwards recover it.

"The sensibility which I call *recurrent* does not pertain exclusively to the anterior roots of the rachidian nerves; I have found it also in the facial nerve, and it exists probably in still other nerves. I am now occupied with researches in this respect, and shall probably have the honor of communicating them to the academy. I shall merely add to this note the recital of some experiments which I have made with my habitual collaborator, Dr. Bernard, well known to the academy, and who has taken the trouble to describe them. *First experiment:* In a living and healthy dog, three to four months old, the lumbar medulla was laid bare on the right side to the extent of two vertebræ; the nervous roots exposed were the fourth and fifth lumbar. Immediately after the experiment, by which the animal was somewhat distressed, the anterior root of the fourth lumbar pair was pinched and yielded no manifest signs of sensibility; neither did the anterior root of the fifth lumbar pair. Those two roots were then cut in such a way that there might result from the section peripheric ends and ends adjoining the marrow. The animal evinced no pain at the moment of the section of the anterior nervous roots, and the pressure upon these two ends of nerves, resulting from the section of the root, produced no evident signs of sensibility. Afterwards the facial nerve on the jaw was laid bare and its branches were transversely divided, when again the peripheric ends, on being pricked, manifested no signs of sensibility. After these first trials the animal was left for some moments at rest from the general

disturbance caused by the experiment. It then became possible to verify in the clearest manner the sensibility of the peripheric ends of the anterior roots of the fourth and fifth lumbar. The peripheric ends of the branches of the facial nerve also evinced sensibility in the most distinct manner. This recurrent sensibility of the anterior lumbar roots and of the facial nerve was prolonged with equal intensity during the whole day. Four hours after the experiment, the acute sensibility of the peripheric ends of the lumbar roots and of the facial nerve was still found to exist in the most lively activity, and continued to do so even the next day, (twenty-four hours after the experiment,) notwithstanding the commencement of swelling and suppuration of the wounds. *Second experiment:* In a lively and healthy dog, of medium size and from four to five months old, the lumbar medulla was laid bare on the right side to the extent of a single vertebra, the pair exposed being the fifth lumbar nerves. The anterior root of this nervous pair being lightly disengaged, was pricked and found to be evidently sensible. After this sensibility had been verified at several intervals, the anterior root was cut, and the peripheric end found to retain its sensibility, while the end adjoining the marrow had become completely insensible. The wound of the back was then sewed up. On being examined anew five hours afterwards, nothing had changed; the sensibility of the peripheric end of the anterior root remained in full activity, and the complete insensibility of the central end was persistent. The corresponding posterior root was now cut, and pain and agitation were apparent. But the recurrent sensibility of the anterior root immediately disappeared; so that of the four nervous extremities resulting from the division of the anterior and posterior roots, there was but one, the central end of the posterior root, in which sensibility continued to be lively. Twenty-two hours after the experiment the wound had become fetid, suppuration having commenced; yet the exquisite sensibility of the central end of the posterior root, and the complete insensibility of the three other ends, could be distinctly verified. *Third and fourth experiments:* From these, made on animals from four to six months old, the same facts result, namely: sensibility *en retour* of the anterior roots, and of the facial. Sometimes at the very moment of the experiment this recurrent sensibility is not quite evident, and it is then necessary to wait some instants for the animal to recover a little from the disturbance caused by the pain of the experiment. It was then ascertained that the section of the posterior root caused the recurrent sensibility of the anterior root constantly to disappear, and this even eighteen hours after the operation. It was seen also that the sensibility *en retour* of the anterior root having been once destroyed reappeared no more, however long a time it might be waited for. *Fifth experiment:* Made on an adult dog, with the same constant results of the recurrent sensibility persisting till the next day; (the root was attached with a thread.) *Sixth experiment:* Two lumbar vertebræ of an adult dog were laid bare, and it was found, after the animal had been left at rest for some ten minutes, that the anterior roots were sensible; the animal was then bled, and this sensibility *en retour* disappeared, while the sensibility of the posterior roots was always persistent."

Conclusion.—I have repeated all the experiments of M. Magendie on the recurrent sensibility, as well alone as in company with M. Bernard, and have caused them to be repeated perhaps twenty times in my laboratory by my *aide-naturaliste*, Dr. Philipeaux, whose skilful and practiced hand may justly be regarded as an additional guarantee. I have thus verified, even to the smallest details, all that M. Magendie had observed, and all that he has recounted in his Note of 1847. To reproduce these experiments with success, care must be taken to practice them under the requisite conditions: First, to open the rachis but on one side. Second, to expose the roots of but one or, at most, of two nerves. Third, not to explore the roots until the lapse of five or six hours after the first operation, in order that the animal may have recovered from the disturbance at

first experienced from the blood lost, and that the wound which has become cold may have regained a certain degree of heat and reaction.

These experiments prove: First, that the *posterior root* is exclusively and essentially *sensitive*; I say *essentially*, because if we divide the *anterior root* the *posterior* remains not the less sensitive. Secondly, that the *anterior root* is essentially *motive*; *essentially*, because if we divide the *posterior root* the *anterior* does not the less remain *motive*. And, on the contrary, the latter (the *anterior*) is essentially *sensitive*; for if we cut the *posterior root* it immediately ceases to be so. It is not so, then, in itself—it is only so through the other; and so exclusively through the other that if, leaving this other (that is, the *posterior root*) intact, it be itself cut, it is that one only of its two ends which is attached to the other (to the *posterior root*) that remains *sensitive*.

There remained a final experiment, and this M. Magendie proceeded to make. The *sensibility* of the *anterior root* flows to it, is derived from the *posterior root*, but how and by what means? What route does it pursue? Is this derivation accomplished immediately on the junction or union of the two roots, or afterwards? "This extinction," says M. Magendie, "of the sensibility of the *anterior root* by the section of the *posterior root* is a constant fact, and suggests the experiment of cutting the nerve beyond the junction of the roots, leaving these latter intact. I isolate the trunk of a rachidian pair at nearly six lines from the ganglion. You see plainly that the roots of this nerve are sensitive; I irritate them one after the other, and the animal appears to feel almost as acutely when I touch the *anterior* as when I touch the *posterior root*. I now cut the trunk of the nerve at about four lines from the junction of the roots. Let us try whether these roots remain sensitive: I pinch the *posterior root* and the sensibility is the same—it has neither diminished nor augmented. I pinch the *anterior root* and find that this is no longer sensible. I conclude, then, that the sensibility furnished by the *posterior root* to the *anterior* is transmitted at a point still more remote than that on which I have operated. New researches must be made before the place of the nerve can be determined at which this transmission occurs. Can we suppose that it is at the very extremity of the nervous divisions, and that the fibres of termination inosculate with one another?" (*Lectures on the Nervous System*, &c., t. ii, p. 344.)

I have also repeated this experiment many times and with a uniform result; the section of the two *roots*, immediately after their junction, abolishes the *sensibility* of the *anterior root* just as it is abolished by the section of the *posterior root* itself.

EXPERIMENTS ON THE FIFTH AND SEVENTH PAIRS.

1. One of the finest experiments of M. Magendie was that which he performed on the *fifth pair*. M. Bell had already made this experiment, but by another procedure. He had contented himself with cutting the sub-orbital and frontal nerves, and the nerves of the chin at their exit from the canals of which they bear the name. M. Magendie was the first who cut the *fifth pair* within the cranium.

"The nerve which presides over the sensibility of the whole face," he says, "is the *fifth pair*. You will see that, by cutting it in the cranium, we abolish not only the tactile sensibility of the skin and soft parts, but even the special sensibility of the senses in the whole side of the face corresponding to the section. Thus the vision, the smell, the hearing, the taste, will be lost from the fact alone that the *fifth pair* has been cut; and yet the nerves that it is agreed to regard as presiding over the exercise of each of these senses shall have suffered no injury." (*Lectures on the Nervous System*, II, p. 27.) This is what he first said; he afterwards stated more exactly: "The section of the *fifth pair* acts on the nutrition of the organ of smell as on that of the eye; the disorders are secondary." (*Ibid.*, p. 43.) The section of the *fifth pair* is limited, in effect,

to the immediate, the direct destruction of the *tactile sensibility*. It destroys vision, smell, hearing, only by the consecutive disorder. M. Magendie himself verified this as regards vision, or the sensibility of the retina. "I cut the optic nerve at its entrance into the eye; if the nerve of the fifth pair or any other could perceive light, the section thus made could not prevent it. But it is quite otherwise; the sight is completely abolished, as well as all sensibility, to the strongest light, even that of the sun concentrated by a lens. Wishing to submit to this last proof an animal whose fifth pair alone was divided, I easily recognized that on causing the eye to pass suddenly from shade to the direct light of the sun, there was an impression, for the eyelids closed. All sensibility, therefore, is not lost in the retina by the section of the fifth pair, though there is but a feeble portion which remains." (*Precis Elementaire de Physiologie*, t. i, p. 100.) M. Magendie had thus formed a just idea as regards *vision*; and the same would have been the result as regards *audition* and *olfaction* if he had made on the acoustic and olfactory nerves the experiment which he performed on the optic nerve.

2. It was known from the admirable experiments of M. Bell that the *sensibility* of the face proceeds from the fifth pair, and the *respiratory movement* from the seventh. A very fine experiment of M. Eschricht, of Copenhagen, suggested to M. Magendie an inquiry in order to determine the action of the fifth pair on the seventh. (See *Journal de Physiologie*, t. viii, p. 228 and 339.) In his *Lectures* we follow, step by step, the progression by which he passes from the idea of a recurrent sensibility by *nervous anastomosis* to the idea of a simple association of the fibres of one pair with those of another.

"The sensibility of the facial nerve," he says, (*Leçons sur le Systeme Nerveux*, t. ii, p. 166,) "is communicated to it by its anastomosis with the fifth pair. This expression of *anastomosis* will cease to represent a just idea if, by anastomosis, we understand the fusion of two nerves into a single one; there is no true fusion in the case. I had heretofore thought the contrary, but my last experiments force me to modify my views. The branches of the fifth pair, and of the seventh, which we find united, have their fibres associated in such a manner that each fibre preserves the respective properties of the nerve from which it emanates. Thus the fibres of the fifth pair remain sensitive fibres; the fibres of the seventh pair remain motive fibres. The trunk which they constitute by their association is thus a trunk composed of motive and of sensitive fibres, and not of a single order of fibres sensitive and motive at the same time. Cut the nerve of the fifth pair; there remain only motive fibres, and all sensibility disappears. If then I avail myself indiscriminately of the words *association*, *anastomosis*, you will know what signification I give them. (*Leçons*, &c., t. ii, p. 185.) We know now what is to be understood by anastomosis between a nerve of sensibility and a nerve of movement. The sensitive fibres associate themselves with the motive fibres, and wherever the former exist you meet with sensibility. The association of two nerves is attended with no confusion of their properties; they are exercised conjointly in the same nervous trunk, but they remain independent, since we can isolate them. (*Ibid*, p. 191.) The seventh pair receives from the fifth, not sensibility, but sensitive fibres. Its own fibres form a nerve exclusively motive. (*Ibid*, p. 209.)

Cerebro-spinal liquid.—As early as 1825 M. Magendie had read to the academy a memoir on this subject; he read a second in 1826, a third in 1828. Long before, however, in 1769, the celebrated Italian physician Cotugno had recognized and described this liquid; but what Cotugno had said was altogether forgotten when M. Magendie in turn occupied himself with this important subject.*

* *Circa medullam, per spinam descendente, &c.*—"Around the medulla, as it descends through the spine, there is a considerable space; but this extra space is not wholly free. Along it descends the *dura mater*, which, formed into a tube at its exit from the great occip-

What the Italian did not see or saw but incompletely, and M. Magendie has placed beyond doubt, is: 1st, that this liquid exists in all ages: 2dly, in the normal as well as disordered state; 3dly, that it is deposited not in the cavity of the arachnoid, but below that membrane, around the encephalon and the medulla; 4thly, that the *pia mater* is its secreting organ; 5thly, that there is a particular point, called by M. Magendie the entrance of the ventricles, by which the liquid penetrates from the exterior of the brain into the cavities, into the *ventricles*, the *conduits* of that organ.

"Is it not remarkable," he says on this occasion, "that the parts of the brain named by the ancient anatomists *valvula*, *aquæ-ductus*, *pons*, have precisely the use which their name indicates? The *valvula* of Viensses, or the great valve of the brain, fulfils, beyond doubt, the functions of a *valve*, since it resists the egress of the liquid which traverses or which fills the fourth ventricle. No part could better merit its name than the *aqueduct* of Sylvius, since, according to the experiments which I have reported, this canal conveys sometimes the water of the ventricles towards the spine, and sometimes from the spine towards the head. Lastly, what is called the *pons* is, in effect, a great medullary arcade, inverted and placed below the current of the liquid which traverses the aqueduct."—(*Journal de Physiologie*, t. vii, p. 29.)

A great anatomist of recent times, Scemmering, even places the *seat of the soul* in the *liquid of the ventricles of the brain*: "If it be permitted us to assign a peculiar organ to the common sensorium, or if there be a proper seat for the common sensorium in the brain, it is not without some show of reason to be sought for in this liquid."*

APPENDIX II.

ANALYSIS OF THE RESEARCHES OF SIR CHARLES BELL ON THE NERVOUS SYSTEM.†

In order to convey a clear idea of the merits of M. Bell, and the particular character of his new views on the nervous system, it is necessary to say a word respecting the doctrines which prevailed, previous to his time, on that important subject.

"If we pass in review," says M. Bell himself, "the opinions respecting the brain and nerves which have been held at different times, we find one theory which had been maintained from the Greek authors down to the age of Willis, and which has been transmitted, with few changes, to modern authors." Now, this theory which had passed from the Greeks to Willis, and from Willis to

ital foramen, encloses the spinal marrow, like a sheath, to the termination of the *os sacrum*. Yet this tube of the *dura mater* is not so wide as to reach everywhere the circuit of the cavity of the spine, nor so narrow as to embrace closely the included medulla; but is somewhat distant from the cavity of the spine, chiefly behind and at the place of the apophysis, and is at the same time separated by a considerable space from the periphery of the medulla which it encloses. Now, this space between the vagina furnished by the *dura mater* and the marrow, is always *full*, not with medullary matter, nor, as some learned men in so obscure a subject have conjectured, with a vaporous exhalation, but with *water*, similar to that which the pericardium confines around the heart, which fills the hollow spaces of the ventricles of the brain, the labyrinth of the ear, and, in short, all the cavities of the body from which the free air is to be excluded, &c. (Dominici Cotunni: *De Ischiade Nervosa Commentarius*, Vienna, 1770.)

* Peculiare organum sensorii communis si ponere fas est, vel si propria sedes sensorio communi in cerebro est, haud sine veri quadam specie hoc in humore quæri debet.—(*De Corporis Humani Fabrica*, vol. iv, p. 69, 1798.)

† In this analysis of the researches of Bell there will doubtless be some repetition of what has been said in the Memoir or Notes, but it is not the less needed in order to present the complete filiation of ideas.

modern authors, was the theory of *spirits* derived from Galen. Galen, that great theoretical cultivator of ancient physiology, had imagined *spirits* of three kinds: the *natural*, which were formed in the liver; the *vital*, which were formed in the left ventricle of the heart; and the *animal* or *cerebral*, which were formed in the brain. Willis very much simplifies matters; with him, all the spirits are formed in the brain: *Statuimus hos spiritus solummodo in cerebro et cerebello procreari*; all, it seems, are formed in the brain, and with not much difficulty, as we shall see. It is, in fact, merely a chemical operation: *velut in opus chemicum*.* The blood is carried into the brain and the cerebellum by the narrow vessels of the plexus, as by the flexuous tubes of an alembic, *veluti per serpentinis alembici canales*; and then, in the substance of these two organs, *intra utriusque substantiam*, the finest, most volatile and most subtle particles are evolved from the blood; these particles are the *spirits*.

But do these *spirits* really exist? This is the only question which Willis forgets to propound; for, in other respects, there are not a few which he proceeds to ask. He inquires why it is that these spirits, being so thin, so subtle, so fitted for escaping—*particulæ ad avolandum aptæ*—do not in effect escape; and he answers that they are confined or *cohibited*, to use his own expression, by the membranes of the brain, as by the cap of an alembic—*velut alembici obductione*. He even asks what they are—*quid sint?*—and he avows that he cannot venture to compare them too closely with the *spirits of wine* or of *terebinth*, seeing that these may be poured from one vessel into another, or even be distilled, without being lost; while, as for the *animal spirits*, they are so subtle that after the death of the animal no traces of them are to be found.

These *animal spirits* were the mysterious resource of all modern physiology, from Descartes to Borden.† Borden having skilfully turned them into ridicule, less use was made of them. Eventually, in the latter years of the last century, a new term was substituted for the old one; the *animal spirits* became the *nervous fluid*. M. Cuvier still wrote in 1817: "It seems to us that an explanation may be rendered of all the phenomena of physical life by the simple admission of a fluid such as we have just defined;"‡ that is to say, the *nervous fluid*.

Things were at this point, or nearly so, at the time when M. Bell began to think for himself on the nervous system. "It was supposed," he says; "that the brain secreted a *nervous fluid*, that the nerves were the channels which conveyed it, and that all were endowed with the same properties. With this apparent simplicity of doctrine," he adds, "never has there been presented so great a number of errors in the history of any science."

The basis of this doctrine, so *simple*, as M. Bell justly remarks—for the whole is here reduced to a single fluid—was the *uniformity*, the *homogeneousness* of action. For homogeneousness of action M. Bell substituted *speciality* of action, and this was the first, the fundamental feature which separates his theory from the old one. "The key," he says, "of my whole system will be found in this single proposition: each filament of nervous matter is endowed with a peculiar property independent of that of other filaments which occur along with it, and this it preserves throughout its whole extent." (*Natural System of the Nerves of the Human Body*.)

The whole work of M. Bell is an analysis. From the date of his first *essay*, in 1811,§ he separates and distinguishes the functions of the *posterior roots* of the nerves from the functions of the *anterior roots*. This essay, too far in advance of the physiologists of that day, attracted little or no notice; the author, through discouragement, maintained silence for ten years. In 1821 he resumed

* *Cerebri Anatome, cui Accessit Nervorum Descrip. et Usus*. London, 1664.

† For the refutation of *animal spirits* by Borden, see my work entitled *De la Vie et de l'Intelligence*, p. 43, &c. Paris, 1858.

‡ *Le Règne Animal*, &c., t. 1, p. 35, first edition.

§ *Idea of a New Anatomy of the Brain*; submitted for the observations of his friends.

the subject, and presented to the Royal Society of London his *Natural System of the Nerves*, a new analysis, almost as ingenious and subtle as the first, and which gives him his three classes of distinct nerves: the nerves of *sensation*, those of *voluntary movement*, and those of the *respiratory movement*.

I shall divide the labors of M. Bell as he has divided them himself; I shall distribute them into two epochs. The first will be that in which he distinguishes the functions of the *roots* of the nerves; the second, that in which he discriminates the different *classes* of nerves from one another. I shall afterwards say something of his discussion with M. Magendie.

FIRST EPOCH.—*Distinct functions of the roots of the nerves*.—How did M. Bell arrive at this great and fundamental distinction? He has himself told us: "I owe my first ideas to the inductions which I drew from the anatomical structure, and the small number of my experiments had for their object only the verification of these first ideas." He adds: "When, in making researches on a subject of this nature, we follow the natural order of ideas and a philosophical method, when we examine with care the facts which anatomy presents, every experiment is decisive, and truth shows itself so evident and simple that nothing can be more satisfactory to the observer." This is well said, and discloses the process of the author; he proceeds from anatomy to experiment, but to experiment only in his own defence. What, then, did anatomy yield him?

In observing with close and constant attention the disposition, distribution, origin, in a word, the *anatomy* of the nerves of the spinal marrow and of the encephalon, what especially struck him—and the more forcibly the more he considered it—was the perfect regularity of the former and the extreme irregularity of the latter. All the nerves of the spinal marrow are perfectly regular; they all spring from two series of roots pertaining, these to the posterior region, those to the anterior region of this medullary column. The nerves of the encephalon, on the other hand, are all of a surprising irregularity; some spring from a single anterior root; others from a single posterior root; others, again, from a single lateral root. One only, that of the fifth pair, springs from two distinct roots—one posterior and the other anterior—like the nerves of the spine.

Whence this diversity of origin of the nerves of the encephalon? Wherefore two sources for the nerves of the spinal marrow? Would not this diversity of origin indicate a diversity of functions? Thus the leading idea—the idea of diversity of function suggested by diversity of origin—was grasped; and thus far the genius of the discoverer stood as the sole intermediary between the idea and anatomy. But it remained to retrieve this idea, so novel and withal so true, from the category of mere supposition or conjecture, and for this anatomy did not suffice. When Harvey—that perpetual model for all who propose to study the obscure mechanism of living beings—had satisfied himself of the arrangement of the valves of the veins, disposed in such a manner as to favor the course of the blood from the members to the heart, and obstruct it from the heart to the members, he made a very simple but decisive experiment. He tied a vein, and saw it swell on the side of the members, and not on the side of the heart. The blood therefore flowed, in the veins, from the members to the heart, and not from the heart to the members, and the circulation of the blood was demonstrated.*

M. Bell did as Harvey had done. After having long meditated on the anatomical disposition of the *origin* or *roots* of the nerves, he devised an experiment which should likewise be decisive, and executed it. "It was first necessary," he says, "to ascertain whether the phenomena, developed after the lesion of the different roots of the nerves of the spine, were found to correspond with what anatomy would indicate. Hesitating for some time on account of the nature of

* See the *Histoire de la Decouverte de la Circulation du Sang*, by M. Flourens, p. 41, (second edition.)

the operation, I at length proceeded to open the cavity of the spine in a rabbit, and I cut the posterior roots of the nerves of the inferior extremity; the animal could still move itself, but the cruelty of this dissection prevented me from repeating the experiment. I thought it would suffice to make it on an animal newly stunned and insensible. I therefore struck a rabbit behind the ear, so as to deprive it of sensibility by the shock, and then laid bare the marrow of the spine. On irritating the posterior roots of the nerve, I could perceive no consequent movement in the muscular tissue; but when I proceeded to irritate the anterior roots, there ensued, whenever the instrument touched them, a corresponding movement in the muscles to which the nerve was distributed. These experiments proved that the different roots, and the different columns whence those roots proceed, are destined to different functions, and that the indications furnished by anatomy were correct."

It would be puerile and unworthy to dwell too much upon the faults of this experiment, ever memorable as it is, as being the first. The author says that "the cruelty of the experiment prevented him from repeating it." If he had observed more closely what took place when he cut the posterior root, (and he might have confined himself to irritating it, which would have been still less cruel than cutting it,) he would have seen the animal give signs of distress; the indications of sensibility, of pain, would have manifested themselves, as they always do in such cases, and, in this respect, everything would have been determined. In the second place, to begin by stupefying the animal, by rendering it *insensible*, when *sensibility* was precisely one of the phenomena to be verified, was no doubt the way to render the experiment less painful, but it was also, with deliberate purpose, to render it insufficient and incomplete. It was to instigate more complete ones, which would be made by others, and in effect to multiply the chances of *cruelty* in place of diminishing them.

And this was, in fact, what happened. The experiments of M. Bell were everywhere repeated, and no one was more gratified thereat than himself. "I have only to add," said he in 1825, (fifteen years after his first *Essay*,) "that it has redounded to the satisfaction of all Europe, that these opinions and experiments have been followed up. It has been recognized that the anterior roots of the nerves of the spine excite muscular movement, and the posterior roots sensibility. When, in an experiment, the anterior roots of the nerves of the leg are cut, the animal loses all power over the leg, although the member preserves its sensibility. But if, on the other hand, the posterior roots are cut, the faculty of movement will still exist, although the sensibility be lost. If the posterior column of the spinal marrow in an animal be irritated, it appears sensitive to the pain, but no similar effect is observed when the anterior column is touched."

SECOND EPOCH.—*System or classification of the nerves.*—In 1821 M. Bell read to the Royal Society his first memoir on what he calls the *natural system of the nerves*. His *Essay* of 1811 had passed almost without notice, as has been just said. The present memoir produced a profound impression. It was because the author at last addressed himself to the true judges, to a learned company, and because by the very reading of his work he stimulated it to reflection. It was, besides, the first time that the light of physiology had penetrated into the study, until then purely anatomical, and until then wholly sterile also, of the *nerves properly so called*. What had the anatomists of all countries been doing, before M. Bell, in their researches on the different nerves? They had been emulously striving who should find some new ganglion or some unknown nervous filament, without, however, attaching the least idea to that ganglion or that filament.

"As long as it is supposed," says M. Bell, "that the nerves proceed from a common centre, that they have the same structure and the same functions, that they are all sensitive, and that they all contribute to convey what is vaguely called

the *nervous current*, these discoveries of new nerves and new ganglions will not only be useless, but prejudicial; they will serve only to increase the confusion."

A single philosophical, but just and precise idea sufficed M. Bell for the removal of this confusion. He sees two distinct nerves distribute their branches to all parts of the face; three nerves of different origin proceeding to the tongue, four to the throat; the nerves of the neck presenting a most complicated arrangement; and he inquires why is this? Why this multiplication of nerves—why different nerves for the same part? Why, for example, two nerves for the face? "Here," says M. Bell, "we naturally ask, whether these nerves fulfil the same function—whether they contribute a double *contingent* of the same property or *faculty*, or whether they do not fulfil different functions? After having called to our aid," he continues, "all the information furnished by the structure of the human body and by comparative anatomy, we proceed to decide the question by experiments." Thus we see, it is always anatomy which proposes the question, which suggests the idea; but, as we further see, it is always experiment, and experiment inevitably, which gives the answer.*

M. Bell therefore divides, in an animal, the seventh pair, that is to say one of the two pairs between which a decision is to be pronounced, and the animal loses only the *respiratory movement* of the face, simply the *dilatation of the nostrils*. He divides the fifth pair in another animal; this loses the movement of the lips which serves for manducation, a *voluntary movement*; but it preserves the movement of the nostrils, a *respiratory movement*. The former no longer respire by its *nostrils*, yet uses its lips to collect its food; the latter respire by its *nostrils* as usual, but can no longer use its lips to collect its food and eat. Nor is this all: when the seventh pair is cut, the animal does not suffer; and when the fifth pair is cut, it experiences acute pain. Again, the seventh pair being cut, the face preserves all its sensibility, while, the fifth pair being cut, all the sensibility of the face is lost. A difference of properties, then, of the most express nature separates the seventh pair from the fifth. The former is *insensible*, is purely *motive*, and serves only for the *respiratory movement* of the face; the latter is at once *sensible and motive*, and serves at the same time for the *sensibility* of the face and its *voluntary movement*.

There are nerves, therefore, which are only *motors*, like the seventh pair; others which are at once *motors* and *sensitive*, like the fifth; and others still which are only sensitive, like all the nerves, for example, of the *special senses*. And, as regards each nerve, its property, its function depends on its origin. The nerve of the fifth pair springs from two roots, the one *anterior*, the other *posterior*; it derives from the former its *motive* faculty, and from the latter its *sensitive* faculty; it is a *double* nerve, a nerve composed of two nerves, one anterior, the other posterior—one for *movement*, the other for *sensation*. Though springing from the encephalon, it is, from its two-fold origin and its two-fold function, a true nerve of the spine.† The nerve of the seventh pair, on the contrary, is a *single* nerve; it has but one origin, and that is anterior; it is purely *motive*. Lastly, the nerves of the senses have also but one origin, but this is posterior, and they are purely *sensitive*.

Upon this principle of their radication, then, (and the great result of the researches of M. Bell is to have taught us that it is by their radicles that we must

* "Experiments," says M. Bell, "have never led to discoveries." (*Natural System*, &c., p. 251.) This is not wisely said; it is to make experimental art bear the whole burden of the ill-humor entertained towards the experiments of M. Magendie. "Let the physiologists of France," M. Bell further says, "borrow from us and follow up our opinions with experiments," (p. 257.) This *troublesome* M. Magendie has cost us many a sarcasm.

† Add to this that, like the nerves of the spine, the posterior root, that namely of *sensation*, is provided with a *ganglion*. It was supposed, previous to M. Bell, that the office of the *ganglions* was to arrest sensibility. It has been found, by experiment, that the *posterior*, that is the *sensitive* nerves are precisely those which have a ganglion, and they are the only ones which have it.

be guided,) there are three classes of nerves; nerves purely *motive*, nerves purely *sensitive*, and nerves at once *motive* and *sensitive*: the first with a single and *anterior* root, the second with a single and *posterior* root, the third with roots both *anterior* and *posterior*. Never had a more vivid light been shed upon a subject more obscure, confused, and, to use the received term, more *inextricable*.

The nerves, then, are at length classified, and their classification may be called, as M. Bell in fact calls it, a *natural* classification; for it is given at once by the *origin* and the *function*—that is to say, by the two characters which are the most sure, whether regarded in the light of anatomy or physiology.

I have counted but three classes of nerves; M. Bell makes four: it is because I deliberately omit the *great sympathetic*, upon which he has bestowed too little attention to make it worth mentioning here.* It has been seen, moreover, that, besides the two columns of the spinal marrow, the *anterior* and *posterior*, M. Bell admits a third, which he calls the *lateral column*. This third column, which appeared to him so important, is at present, and with reason, regarded as being at least very problematical. Of the five nerves which M. Bell considers as springing from it, and which are the five *respiratory* nerves—the *pathetic*, the *facial*, the *spinal*, the *pneumogastric* and the *glosso-pharyngian*—the first three spring from the anterior column and are exclusively *motors*; the fourth springs from two roots and is *motive* and *sensitive*; the fifth springs from the posterior column and is exclusively *sensitive*.

To consider, then, only what is clear, established, and will be permanent in the researches of M. Bell: the spinal marrow (and I do not here separate from it the *medulla oblongata*) is composed of two columns, the one *sensitive*, the other *motive*. All the nerves which spring from the sensitive column are *sensitive*; all those which spring from the motive column are *motors*. From the *origin* may always be inferred the *function*; from the *function* may always be inferred the *origin*; and M. Bell was not deceived when, from the simple anatomical diversity of *origin*, he had foreseen the physiological diversity of *function*.

THIRD EPOCH.—*Discussion of M. Bell with M. Magendie*.—This discussion relates to two points: first, the discovery of the proper functions of the roots of the nerves; and, secondly, the discrimination of the special functions of the seventh and fifth pairs.

In reference to the first point, M. Magendie read to the Academy, July, 1822, a memoir in which he announced that having cut the posterior root of a nerve in an animal, he had only abolished *sensation*, and that having cut the anterior root, he had only abolished *movement*. This result was received with the admiration merited; but some months later M. Magendie read a second memoir, in which he retracted all that he had said and discredited all that he had done. Each root was no longer exclusively *sensitive* or *motive*; each was both one and the other: only, the anterior root was more motive than sensitive, and the posterior more sensitive than motive.

There could scarcely have been a greater advantage offered to M. Bell. Hence, in a *note* which he attributes to a pupil, a pretence which could not but render recrimination more easy and acrimonious, M. Bell incessantly presses his adversary with this dilemma: Either, he says to him, you adhere to your former memoir, and then I have over you a priority of at least ten years; or you abide by the second, and there is then nothing in common between us, no longer any subject of debate; I maintain the exclusiveness of action of each root, and you return to the old idea of the accumulation of two actions in each. What reply could there be to this reasoning? As a man of sense, M. Magendie did not reply at all; he did much better; he made a new discovery, and one fully as difficult at least as the first: he discovered the *recurrent sensibility*.

* He regarded it as the *lien* "which seems to unite the three other orders of nerves (those of *sensation*, those of *voluntary movement*, and those of the *respiratory movement*) and the body itself in one whole." (*Natural System*, &c., p. 5.)

I proceed to the second point of the discussion: the special functions of the fifth and seventh pair. M. Bell had contented himself with cutting the fifth pair at its exit from the *foramina* of the face; M. Magendie boldly divided it within the skull. The result, from this circumstance alone, was more striking; but from this result, imposing as it was, how many inadmissible consequences did he draw? He pronounced the fifth pair to be not only the nerve of general sensibility, of the *tactile* sensibility of the face, but also the nerve of all the proper organs of the senses. It was the nerve of *olfaction*, of *audition*, of *vision*; he took certain simple effects of a subsequent alteration for *direct* and *immediate* effects.

M. Bell, more practiced than he in analysis, pointed out to him that the phenomena in question are more complicated than he supposed. In the phenomenon of *olfaction*, for instance, there is the sense of smell, the act of scenting, and the tactile sensibility; the first depends on the olfactory nerve, the second on the seventh pair, and the last on the fifth pair. "Having caused a dog," says M. Bell, "to respire ammonia, after the seventh pair had been cut, it experienced at first no effects of irritation of the pituitary membrane. This was because it no longer possessed the power of snuffing up, or drawing in with force, the ammoniacal vapor. * * * If I had not paid attention to these circumstances, I might have believed, in view of what I saw, that the nerve of the seventh pair was the nerve of smell, as a well-known French physiologist has done, who has concluded too precipitately that he had discovered the nerve of vision and of smell in the fifth pair."

It is not difficult to see the different turns of mind in the two men whom I compare: the one was more meditative, more thoughtful—the other more a man of action than of thought; the one might be said to have placed no sufficient value on experiments, the other no sufficient value on ideas; the one would never probably have made experiments had he not begun by having ideas; the other might perhaps have had but few ideas had he not begun by multiplying experiments.

Charles Bell (born 1774, died 1842) was the fourth son of a poor Presbyterian minister of Scotland. The second of his brothers, John Bell, having become professor of surgery in the University of Edinburgh, invited him thither, and initiated him in anatomical studies and instruction. First impressions are strongest; a single good indication given in time furnishes sometimes the opening for a career. Mr. John Shaw, in a prefatory account of Mr. Bell,* tells us that "he commenced his public labors as assistant of his brother, John Bell, who relinquished to him the part of the course of anatomy which treats of the nerves, and counselled him to study the brain by its base, by its relations with the spinal marrow, instead of cutting it by horizontal sections. The intelligent student soon perceived many things which he has developed in this volume, and which might perhaps have always escaped him, had he not then formed the habit of constantly considering, under this point of view, the relations of the brain with the rest of the nervous system."

Arrived at the age of thirty years, Charles Bell felt ill at ease in a dependent situation. Quitting his brother, and removing to London, he there long endured isolation and poverty. In 1805 appeared his first work, the *Anatomy of Expression*. In 1811 he produced his *Sketch of a New Anatomy of the Brain*, the small success of which was the source, as has been already said, of much discouragement. Having been appointed surgeon of the hospital of Middlesex, he seemed wholly devoted to instruction and practice; yet we find, in one of his letters of that date, this passage: "Under a semblance of forgetfulness I am always brooding over my grand idea; it occupies me unceasingly."

Some years later, on quitting a session of the Royal Society, in which he had read his first and successful memoir, he remarked: "At last I may assure myself that I am no visionary. My discovery will place me by the side of Har-

* The Nervous System of the Human Body, as explained in a series of papers read before the Royal Society of London, with an appendix of cases and consultations on nervous diseases. Edinburgh, 1836.

vey. This affair of the nerves may require much time to become what it ought to be, but I indulge myself with the idea that I have made a discovery not surpassed by any in anatomy; nor am I yet at the end of it." This, however, was but a passing gleam of satisfaction; ambitious and delicate minds are always vacillating between exaltation and distrust. He wrote shortly afterwards: "The satisfaction which I have enjoyed in my researches has been very great; the reception which science has given them has been the reverse of what I expected. The earliest announcement of my discoveries obtained from professional men not a word of encouragement. When, subsequently, the publication of my memoirs by the Royal Society rendered it impossible that some attention should not be paid to them, the interest which they excited inured only to the advantage of those who contradicted them, or those who pretended to have anticipated me. It has become for me an affair of but little importance." He was mistaken; it was to him *the important affair*; he would have preferred, however, that it should have been a little more so that of all the world, and that the attention at first bestowed should not so soon have grown languid. He did not recollect Fontenelle's saying: "The admiration of mankind is a sentiment which only craves leave to terminate."

The memorials of our savant have been collected, as I said just now, by his brother-in-law, John Shaw. The warm controversy raised by the new views which he had introduced into science was distasteful to his meditative and serious temper, as well as to his sense of personal dignity. He stood aloof from it, and returned into Scotland, almost disgusted with ambition. "My dear friend," said to him the aged Professor Lynn, "you will never change. If you live to be old, you will be the same child, but with crutches." After his poetical manner, he writes in his private journal, at his departure from London: "I find myself to-day like a bird whose nest is in the cap of a school-boy."

A sojourn in his country wrought in him no change of mood. After filling for some years, at Edinburgh, the chair which his brother had occupied, he travelled on the continent. Artistic Italy attracted the greatest share of his admiration. The following is his judgment, evincing at least profound feeling, respecting Michael Angelo. It should not be forgotten that he himself possessed a superior, an exquisite talent, as designer and painter, and that he has written a book, equally esteemed by the man of science and the artist, on the *anatomy of expression*.

"In these statues," he says, speaking of two statues of Day and Night at Florence, "Michael Angelo has displayed great perception of art and a genius of the first order: the combination of anatomical science and of ideal beauty, or, rather, grandeur. It has been often related of him that he studied the torso of the Belvedere, and had it constantly before his eyes. This fine model of antique art may well have been the authority on which he relied for his great development of the human muscles; but the torso could not have taught him the effects which he produced by the magnificent and gigantic members of these statues. Who is the artist, modern or ancient, that would have voluntarily consented thus to demonstrate the difficulties of the art, and to place the human body in this position? Who that would have thrown the shoulder into this violent contraction, and have preserved, nevertheless, with so learned an exactness, the relations of the parts among themselves, the harmony of the bones and muscles? This great man shows us how genius submits to labor in order to attain perfection. It was necessary to have passed through the severe labors of the anatomist to acquire that power of designing which it was scarcely to be hoped would meet with appreciation either then or afterwards."

On his return from Italy, Mr. Bell, having gone to pass some days at the country seat of one of his friends in the neighborhood of Worcester, was there overtaken by sudden death.*

* See, in the *British Review*, (October 10, 1845,) an article full of interest, by M. Pichot, on Charles Bell. From this I have drawn some of the traits of his familiar life.

ON THE SENSES.

3.—THE SENSE OF TASTE

Translated by C. A. Alexander for the Smithsonian Institution from the German periodical
"Aus der Natur, u. s. w."—Leipzig.

"*De gustibus non est disputandum*" is an old and well known commonplace, to which, while prefixing it as a motto, we might give a rendering somewhat different from the usual one, and say: "About taste there is little to be said." No doubt upon such a theme many pages might be easily filled, were we minded to enter the arena of æsthetics and to pursue the chameleon-like idea into all its ramifications; but a sober exposition of the physiological conditions of the sense is so unpromising a subject that we could not help fearing an exposure of the poverty of science, if we did not here, as in our consideration of the sense of smell, propose rather to clear up some of the inveterate errors prevalent among the uninformed than to furnish as thorough an investigation as might be desirable. We reckon herein but little on the interest of the gourmands who may suppose that physiology can be advanced by their manifold experiences in regard to this their favorite sense, and who will, therefore, learn with the deeper indignation that physiology has not only not known how to profit by their researches, but even regards them as the chief sources of the common and widespread errors just alluded to. The fleshy and wonderful member which, as such persons would seem to opine, has been placed at the very inlet of the alimentary canal with scarcely any other view than to preside over gustatory pleasures, offers to our keenest inquiries just as profound an enigma as the organ of smell. Very far are we from being able to explain how that specific sensation, which, without any further power of description, we denominate taste, arises; what is the essential difference between a sensation of sweet and sour; what the real principle which resides in any substance so as to occasion our applying to it one or the other epithet, to say nothing of any possible explication, by the aid of science, of the different *shadings*, as it were, of sapidity cognizable by a nice palate, or of the jargon by which we attempt to characterize them. Here common nerve fibres, between which and those of other organs of sense the closest inspection fails to detect the least difference, serve to interpret to the sensorium, by means of their extremities in the mucous coat of the tongue, the endless variety of so-called flavors of sapid substances; but we seek in vain, either at the outer or inner extremities of these conducting fibres, for any specific apparatus which might enlighten us as to their operations. However indispensable it be, as was shown in our introductory discussion on the sense of feeling, to suppose such an apparatus, yet has all endeavor hitherto to detect it by means of the microscope been baffled; nor, indeed, in the present state of knowledge, were successful research to disclose to us the ends of the nerves of taste provided with minute vesicles or filaments, or any other elementary form, should we understand them any more than we do the already discovered cells at the cerebral termination of all nerves or the small bulbs at the outer extremity of the nerves

of touch. It would probably fare with us as with some ancient Roman raised from the grave and suddenly placed in presence of a telegraphic apparatus or steam engine. In the mean time it would seem the next most important problem of science in this connection to study, with more exactness than heretofore, the terminal points of the nerves of taste in the mucous membrane, in order to discover here, as has very recently been effected in the nerves of the other senses, the elementary form of the nerve ends by which the sensation in question is communicated; whereby we may hope to approach, in the future, somewhat nearer to a solution of the mysterious relation which exists between the contact of sapid substances with the tongue and the peculiar sensations which they are destined to excite.

If we bring into contact with the nerves of sight or of feeling a solution of sugar, or of some intensely bitter substance, such as quinine, they remain undisturbed; neither class of nerves is roused to that state of activity by virtue of which a "current" is hurried to the brain, there to call forth an appropriate sensation. We may conclude then with absolute certainty that there is present in the tongue a mechanism, a contrivance which sugar and quinine excite into different specific kinds of action; that this action is suited to evoke in the nerve filaments peculiar modifications of the beforementioned current; and that this current again must find at the cerebral end of the nerves of taste a special apparatus which so operates upon what we call the soul that, as the final result, a perception of sweetness or bitterness arises. These successive preliminaries to a sensation of taste are at present beyond our scrutiny; it will be well if means are at our disposal to resolve, step by step, with clear physiological facts and inductions, the questions which present themselves in connection with each of them. Nor shall we repine that such problems lie before us. The novice errs if he thinks that a science affords to its votaries a higher satisfaction; the greater the completeness with which it presents itself, the more exactly finished the edifice into which it introduces them. A satisfaction of a different and perhaps superior kind is afforded by science through its very gaps and obscure spaces, but only to him who loyally loves it for its own sake; to accompany a science in its development, to contribute, though it were but a small, inconspicuous stone, to the growing structure, affords a more vivid pleasure than being admitted to a participation in what is already accomplished. There are, it is true, self-styled savants to whom also the deficiencies in a science are more welcome than the completed structure, because those deficiencies are regarded not in a spirit of earnest inquiry, but as affording opportunities for the acquisition of easy notoriety and applause. Shunning the toils of research, they find it more convenient to guess at the future revelations of science than acknowledge their own ignorance, and, overweaving all chasms with flimsy theories, they vaunt the result as knowledge converted into luxury and amusement. With these self-satisfied sciolists, who but too often and easily gain access to the public ear, the detail of facts and laws is derided as pedantry; the slow and cautious processes of inquiry as unworthy drudgery; the reserve and modesty of true science as tame mediocrity or affected obscurity. Let the judicious reader be warned against their empty pretensions. If we once more mark with our reprobation this form of charlatanism, it is because no occasion seemed more proper than when attempting to adapt to popular comprehension, without dissembling difficulties or courting effect, one of the most obscure departments of physiology. We return to our subject.

It is not improbable that the first inquiry we have to propose will at the first glance appear to our readers superfluous, and surprise will scarcely fail to be awakened when it is shown how much obscurity really rests upon the seemingly simple question, *What is the seat of taste, and what organs produce the sensation?* With the common and general answer, *the tongue*, unfortunately we cannot rest satisfied, for it remains further to be asked, first, what part of the

tongue receives the peculiar impression which we call taste ; secondly, whether, besides the tongue, other parts of the cavity of the mouth are endowed with this faculty ; thirdly, to what structural arrangements is it due ? Strangely enough the answers to the three questions are still in dispute, and in part at least are extremely defective. It would seem, on the whole, highly probable that to a very small tract has been assigned the sense of taste, for with more exact exploration its boundaries have been found to be more and more circumscribed. While the older physiologists acquiesced in the popular notion that the tongue is the organ of taste, and ascribed to the whole mucous coat of the mouth, and even of the jaws and pharynx, the faculty of exciting impressions of taste, most of the modern school are unanimous in the opinion that only a small portion of the dorsum of the tongue, and that indeed the hindmost and nearest to the throat, exercises the prerogative of deciding on the sapid properties of transmitted substances. It is true that there are those even now who regard the whole surface of the tongue, including its under side, and even the mucous membranes which line the orifice of the throat, as embraced within the province of this sense, but in our opinion improperly. No one, however, disputes that the hinder part of the dorsum of the tongue is endowed with at least a finer sense of taste ; a conclusion which receives countenance from the commonly observed fact that whenever it is proposed to submit any substance to a closer scrutiny of the sense in question, we instinctively transfer it to that portion of the mouth, where the hard palate also lends its mechanical aid to the investigation ; while it never occurs to any one to test the properties of taste with the point of the tongue, or to introduce the object under the lower surface of that member. If it be difficult to prove conclusively that the rest of the mucous regions under review do not possess a sense of taste, it certainly exists there in a much weaker and more obtuse degree. The discrimination is not so easily made as might be supposed ; in such inquiries there are not a few incidental sources of error. In the first place, care must be taken for trials of this sort, to choose substances which excite a pure and simple sensation of taste, and not simultaneously a sensation of touch, which may readily be confounded with the former. We ought not, for example, to select substances having what is called a sharp, hot, or rough flavor, for those are qualities of a sensation of touch, as are the pungent odors spoken of in our previous article on the sense of smell. [See Smiths. Report for 1865.] Now, as the sense of touch is unquestionably spread over the entire cavity of the mouth, it will be granted that such substances as the above may readily lead to false conclusions respecting the extent of the gustatory area. In the second place, it is of importance to the proposed investigation that the substance submitted to proof should not be conveyed through the medium of the saliva, in which it is of course dissolved, (for only soluble substances are capable of being tasted,) to other regions of the oral cavity, and so be carried to that hinder part of the tongue, whose especial susceptibility to such impressions is admitted. Nor, for this, is any movement of the saliva necessary ; as a lump of sugar placed at the bottom of a vessel of water will, in dissolving, gradually diffuse itself through the whole mass and reach the surface, so may the solution of a similar substance introduced beneath the tongue penetrate the salivary stratum which overlies every part of the cavity, and attain the nerves of taste situated elsewhere. If this be the case, it will of course be difficult to determine the exact seat of the sensation. On the other hand, we are always prone to refer the sensation of taste to the point to which, by virtue of the sense of place, (*Ortssinn*,) we refer the impression of touch produced by the contact of the substance with the ends of the nerves of feeling. In what way this perception of place which connects itself with the sensation of touch arises, has been discussed at large in our previous essay on the sense of feeling. [Smithsonian Report, 1865.]

If the proposed inquiry be conducted with scrupulous regard to the precautions indicated, the conclusion, we think, can scarcely fail to be reached that

only the hinder surface of the tongue is qualified to communicate sensations of taste. The trial may readily be made by every one for himself. Let a small piece of sugar, for instance, be laid on the end of the outstretched tongue, or, as rubbing will tend greatly to promote the sensation of taste, be rubbed thereon, and no perception of the property of sweetness will ensue. Still more convincing will be the result if an intensely bitter substance be employed. The same negative result is obtained if we make the experiment upon other parts of the cavity of the mouth, and with this view the parts to be examined may be touched with a small and delicate brush dipped in the concentrated solution of a sweet or bitter substance. If, in this way, a little drop of melted sugar be conveyed to the uvula which overhangs the orifice of the throat, no taste of sweetness is perceived, provided we take care, in the first place, that the tongue be not brought, by the involuntary retching which is apt to ensue from touching this part, into contact with the uvula, and, in the second place, wait not so long that the solution shall have time to be diffused gradually with the saliva to the underlying surface of the tongue. If the solution be rubbed in with the brush, the sweet taste will be more quickly produced; but even then it unquestionably arises, not from the uvula, but from the back of the tongue, and the more quickly because diffusion is promoted by the rubbing. We think, in short, that we propose nothing unreasonable to our readers, when we invite them to admit with us the circumscription of the sense of taste to the small tract of surface to which we are disposed to assign it.

The question next occurs, to what arrangements does this region owe its adaptation as an organ of sense? Were there here an apparatus as distinctly destined for the service of the sense as we find for that of sight in the eye, we should be absolved from the necessity of so nice an investigation respecting the local extent of the sense of taste as that just described. But this is not the case; on the contrary, we know not a single peculiarity of the region of the tongue empirically assumed as the province of the sense in question; none at least which can be assigned to it with any such manifest certainty as that with which the dioptrical apparatus of the eye, and the auditory apparatus of the ear, may be assigned to their respective functions. Unfortunately, after long debate, it is not yet quite agreed to which of the special nerves of sense is appropriated the function of taste. No less than three distinct pairs are directed to the tongue, each a fasciculus of those minute fibres which we have heretofore compared to the wires of the telegraph, and each springing right and left from different parts of the brain; these are the lingual branches of the widely distributed fifth pair, the glosso-pharyngeal and the hypo-glossal nerves. From our remarks elsewhere, it is sufficiently clear that neither by microscopic observation nor from any peculiarity can we conjecture the distinctive operation of such a nerve; just as it is impossible for us to infer whether a conducting wire, when we observe it at any intermediate point, is destined to set in motion the hands of a clock or the index of a telegraph. Anatomical research, however carefully it may explore the divarications of each nerve in the tongue, leads us here to no definite decision; as well because the local boundaries of the sense of taste are not established beyond doubt, as because many parts are at the same time supplied by more than one nerve, and because, moreover, that nerve which is directed preferably to the hinder part of the dorsum of the tongue, and therefore has the greater probability in its favor, is distributed also to the entrance and neck of the throat, surfaces to which we know the sense of taste is denied. There remains, then, only the physiological experiment from which to await a decision; and this also has its difficulties, though less in the realization than the interpretation of its results. It consists in dividing one of the three nerves, and in this manner intercepting all communication between its two extremities in the periphery and the brain, thus, of course, as effectually preventing the transmission of any current by which a sensible image may be formed, as the communication

between two telegraphic stations would be intercepted by a rupture of the wires. After the division of either of the three nerves in a living animal, it remains to try whether the latter still possesses the power of tasting, for should it appear that, upon the division of any particular nerve, the faculty of the tongue to communicate impressions of taste on being touched with some intensely flavored substance is wholly lost, we shall be justified in concluding that the nerve on which we have operated was the vehicle of those impressions. But here lies the difficulty, for how are we to verify the absence or presence of the sensation in the animal? The animal wants speech to indicate it, and an impression furnishes us with no direct objective token of its existence; resort must, therefore, be had to circuitous procedures, in using which much circumspection is requisite. We should infer the loss of taste, if, after the operation, the animal devours, without signs of repugnance, ill-flavored aliments which in its normal state were constantly refused. On the other hand, if such substances are rejected, we shall be authorized to infer with more certainty the persistence of the sense of taste, when due care has been taken that the nature of the substance is not recalled to the animal by its effects upon some other sense than that which we are investigating. We should, therefore, employ in the trial no substance which, through its characteristic form is familiar to the animal's eye, and as little one which is readily known by its peculiar smell; nor is a substance to be chosen which, through the medium of the nerves of touch in the tongue, produces a sensation of smarting or roughness, so commonly confounded with impressions of taste; finally, we would, in this inquiry, discard anything to which the animal is altogether indifferent. Only such articles, therefore, are free from objection and suitable for a decision of the question as those whose properties can be made sensible to the animal through the sense of taste alone; and none better answers the purpose than a decoction of so bitter and repulsive a substance as colocynth presented in milk. If this mixture be offered to the unwounded dog, allured by the sight of the milk and without suspicion of the foreign substance, he will greedily apply himself to what he supposes to be a well-known dainty; but let a drop once pass the seat of taste, and no sign of disgust will be wanting which a dog can manifest. If, now, we divide one of the three nerves, the glosso-pharyngeal for instance, which chiefly supplies the hinder part of the tongue's surface, and find that the dog devours the milk, notwithstanding its bitter ingredient, with accustomed avidity, we may safely infer that the divided nerve was the channel of the sensation of taste, especially when, after a division of the two other nerves, persistent refusal on the part of the animal has testified a perception of the nauseous admixture.

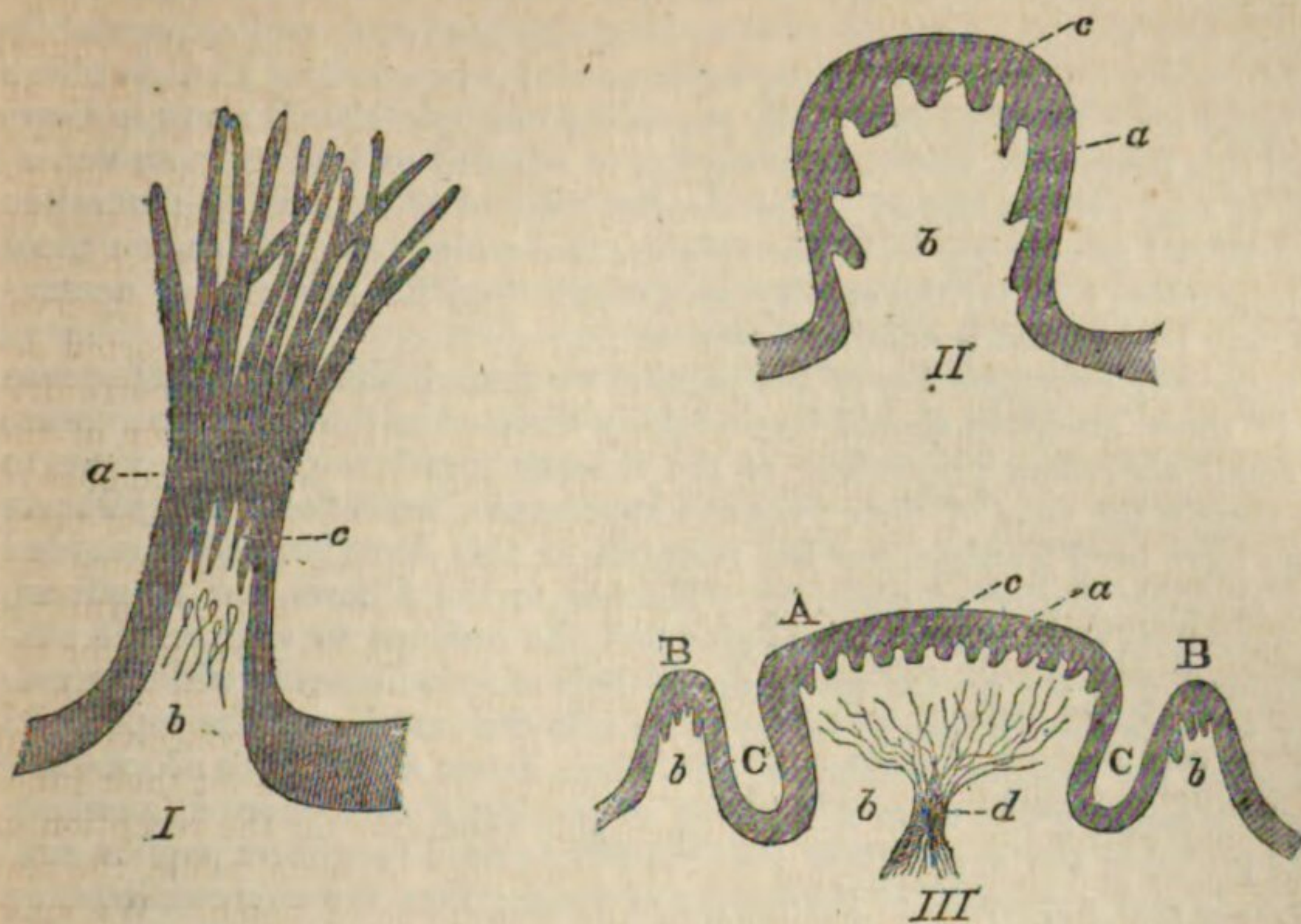
Now, this has been tried with seemingly decisive results: the most careful experiments have uniformly led to the conclusion that the true impressions of taste can only exist when the glosso-pharyngeal nerves are intact; while on the other hand it has been shown with great certainty that the filaments of the hypo-glossal nerve pass to the muscular fibres of the tongue, and by conveying to these the motive current from the seats of the will in the brain, communicate to the organ the power of motion; that, further, the lingual branch of the fifth pair furnishes to the tongue its sensations of touch, thus notifying us of the form, size, weight, softness, or solidity, as well as the temperature, of whatever is introduced into the mouth, and sometimes, too, giving occasion to those perceptions of mordacity or roughness which we are apt to confound with the genuine impressions of taste. We shall not here enter into a discussion of the importance of the service rendered by the two last nerves; our good readers will, perhaps, take the trouble of reflecting for themselves upon the manifold disadvantages under which we should lie in the affair of eating and drinking; nay, how impossible in some cases it might prove, if our tongue possessed not the faculty of moving voluntarily in all directions, nor its exquisite delicacy as an instrument for examining the quality of all substances introduced into the mouth. We must

also be excused for not attempting to give a detailed anatomical description of the true nerves of taste, convinced, as we are, that to the generality of readers such information would be of little avail. We might, indeed, have contented ourselves with assuring them that to a certain nerve, called the glosso-pharyngeal nerve, we owe the sensations of taste, but thought best to present to them an explicit statement of the manner in which this fact has been arrived at, because our object in these essays is rather to interest the laity in the learning of scientific methods than in unprofitable details. The result of these methods in evincing the glosso-pharyngeal nerve to be the vehicle of the impressions of taste, besides the experiments on animals above described, rests also on some scanty observations made upon man himself; for which, but with extreme rarity, a morbid degeneration or even destruction of the nerve in question has afforded opportunity.

The reader will no doubt willingly dispense with a critical discussion of the dissenting opinions of certain physiologists who regard the lingual branches of the fifth pair as partially, if not exclusively, invested with the functions of taste. The fact above mentioned that the glosso-pharyngeal nerve, as its name implies, sends filaments to the pharynx as well as the tongue, neither furnishes an objection to the results obtained by experiment, nor affords a ground for the conclusion that the parts of the mucous membrane of the throat in which its fibres terminate possess also the sense of taste. It may easily be conceived that only those fibres of the nerve passing to the tongue are provided at their inner and terminal extremities with the indispensable apparatus for the reception of the impressions and their conversion into the sensations of taste, while the rest are simply adapted to the transmission of the sensations of touch. We must content ourselves with this as a conjecture, for, unfortunately, it has not been found possible to trace with distinctness the filaments of either of the three nerves to their utmost extremities, and to discover there any special structural arrangement. We shall point out only the following peculiarities of the mucous coat of the tongue. Every one must have observed either in himself or others, or else in the tongue of the ox when it has been prepared for food, that the upper surface is not smooth, but rough; though, in man, the unevenness is so slight, that to the unaided eye this surface presents a velvety appearance, while in the ox it is so rough, both to sight and touch, as to resemble a rasp. Each of the little projections which occupy it appears under the microscope as a very composite organ, on the whole of a quite regular form. We distinguish, according to their outline, three sorts of these projections: the *fungiform*, the *filiform*, and the *circumvallate*, to all of which the general name of papillæ is given. The first are found especially on the upper surface on the point of the tongue; the second are distributed over the whole of the member; the third occur only towards its base, where they are arranged upon its surface to the number of from ten to twelve in the shape of a V. If the tongue be stretched as far as possible out of the mouth this V and the flattened eminences which form it, placed at intervals and surrounded by a sort of foss, may readily be seen. A more exact description of these three sorts of projections will not, we think, be without interest.

As they are merely elevations of the outer coat of the tongue they consist of the same two membranes with that coat, viz: an outer covering, called the epithelium, and the proper mucous membrane. The epithelium consists of cells multifariously superposed on one another, the uppermost layers of which become dried into flat and angular little scales, while the lower are moist and roundish. By the use of the tongue the former are continually worn off, and may be observed with the microscope as a constant ingredient of the saliva, which they render turbid; to repair this loss new cells are always forming below. The layers thus constituted are destined undoubtedly to furnish protection to the underlying mucous tissue which contains the fine and easily wounded vessels and nerves, just as in the external skin the *epidermis*, which is similarly composed,

serves as a protective covering to the cutis. The accompanying figures, representing a section of three sorts of papillæ magnified, may serve as the ground-



work of a more exact description of each. In figure I is presented the section of a filiform; in figure II that of a fungiform; and in figure III that of a circumvallate. In all of them the part designated by *a* represents the epithelium, consisting of squamous and cellular layers; that marked *b* the underlying mucous membrane. It will be seen at first sight that the epithelium in neither form invests the subjacent mucous membrane as a glove does the finger, so that the outer surface of the former shall present an exact impression of that of the latter. In the filiform papillæ it will be observed that the epithelium has a number of long antenna-like excrescences, giving the papillæ the appearance of a brush, while in the others this covering is externally smooth, notwithstanding the inequalities of the underlying membrane *b*, whose surface exhibits in each example a number of successive and rather narrow eminences of a sugar-loaf or conical form. What purpose the antennæ of the first form subserve it is impossible to conjecture; but, as regards the regular elevation of the proper mucous membrane, their presence alike in each of the three kinds of papillæ, as well as the circumstance of their existence likewise in the outer skin, leads to the conclusion that wherever they occur, whatever otherwise their diversity, the physiological signification which they bear must be the same. Now, as the microscope shows us, that, as regards the outer skin and in part, at least, the mucous membrane of the tongue, the finest branches of the blood vessels and the terminal extremities of the nerves are found in these little eminences, the inference is obvious that this peculiar formation of the surface is imposed on account of the organic contents of the eminences, providing, as it does, suitable receptacles in the periphery for the ends of the vessels, and especially the nerves, and securing their regular distribution over the surface. We may conceive that it behooved that the ends of vessels and nerves should closely approach the outer surface at a regulated distance from one another, which purpose indeed might have been attained had these minute organs penetrated at certain intervals from the mucous membrane into the loose strata of the epithelium; but then they must have wanted a sufficiently stable involucre to protect them against the pressure and continual wasting of the shifting elements of that covering. Now, such protection

is supplied by the enveloping projections of the mucous membrane which enter into corresponding cavities of the epithelium. We are aware that this teleological mode of considering anatomical arrangements as directed to a pre-determined end, and contrived with a view to attaining that end, will at present be received in many quarters with entire repugnance; wherefore we shall not here further insist upon it. Enough, if the preceding example should serve to show how well this manner of viewing the subject is adapted to lead us to an understanding of such arrangements. The clearest method of explaining natural as well as artificial mechanism is, in our opinion, that which bases itself upon teleological principles; how far the employment of teleology for purposes of demonstration may be justified is another question.

Returning to a consideration of the papillæ we remark that, for a proper conception of them, attention should be especially directed to the delicate structure of the small secondary projections of the mucous membrane, with a view to seeking therein the ends of the nerves and apparatus of sensation. But hitherto all efforts have been fruitless, nor has research in this direction been rewarded with the slightest degree of certainty. Neither in the filiform, nor fungiform, nor circumvallate papillæ has success attended the attempt to explore the ultimate destination of the nerves which direct their minute filaments with extreme intricacy towards the surface, to follow them into the interior of the superficial projections of the mucous membrane, and there detect a difference of arrangements which might guide us to a decision respecting a difference of functions. However probable the supposition that the filiform and fungiform papillæ contain the ends and apparatus of the nerves of touch; that the circumvallate, on the other hand, which occupy the centre of the seat of taste, and are outwardly so strikingly distinguished, contain those of the nerves of taste; yet we are unable to furnish anatomical evidence for that supposition, or indeed to establish it conclusively through physiological experiments. Even the peculiarity of external form of these latter papillæ is a riddle; we cannot explain what purpose is subserved by their division into a roundish central elevation A, and an annular periphery B, separated from one another by a distinct foss C. If we ventured to assert that this foss furnishes a sort of reservoir in which the solutions of sapid objects are received in order, by longer contact with the sensitive surface, to take more full effect on the extremities of the nerves, while the passage of those solutions over a free surface might be too rapid for distinct perception, we should only be advancing an empty conjecture for which no proof could be alleged. Nothing remains for us, therefore, but to wait until, by persevering and patient observation, some deeper insight into the secret mechanism of the organs in question shall be vouchsafed, and material be thereby furnished for physiological interpretation.

While it fares so unsatisfactorily with our knowledge of the organs of taste, we are, unfortunately, not much better off as regards our knowledge of the nature and conditions of the external influences which call forth a sensation of taste of whatever quality. We know well what substances produce such sensations, and bear in mind a correct idea of the kind of impression connected with their use, so that we again recognize the substances by that impression, or, even without their presence, easily recall, in imagination, the sour, or sweet, or bitter qualities which distinguish them. But this knowledge, in which the epicures must be recognized as graduates, though the basis of our practical use of the sense of taste, avails us little or nothing to a mastery of the physiological theory. We know even more: we know accurately the physical and chemical properties of the greater number of sapid substances, and are dumb notwithstanding to the capital question, what property is it which makes a substance sapid, and qualifies it for the excitement of such or such a sensation? We know no single property common to all sapid matters which can be even remotely identified as the cause of their operation on the nerves of taste, and in which we can seek the source of their peculiar action. To

illustrate our incapacity of arriving by physical or chemical analysis at any decisive results on this subject, we shall cite one or two examples. Sugar may serve as the representative of sweet substances; we know that it is composed of twelve atoms of carbon, hydrogen, and oxygen, and how it is affected by all chemical agents; we know, also, its physical properties, such as solubility in equivalent proportions, requiring here no further discrimination. How is it now that this substance, on its contact, in solution, with the mucous membrane of the tongue, produces an excitation, whether chemical, thermal, electrical, or mechanical, which gives rise, by its action on the ends of the nerves, to that specific modification of the nervous current to which an appropriate sensation of taste instantly responds in the brain? We may well suppose that the sugar does not take effect on the nerves hidden under the epithelium until imbibed by the latter, and thus brought into proximity with their extremities; but even if it penetrated into immediate contact with them, in what respect is the solution of the question advanced? If we bring dissolved sugar into contact with the nerves of the muscles not a fibre stirs; a sufficient proof that sugar is in itself no "adequate" irritant of the nerves. What, then, qualifies the sugar for excitation of the nerves of taste? The obvious answer is, the presence of some special arrangement at the ends of these nerves. But of what sort is it? How and by what means does the sugar operate upon it? How, through those means, is a nervous excitation produced? This is the riddle to be solved, but it offers at present so much resistance to the sharpest powers of divination that we decline any attempt to meddle with it. The matter becomes still more inexplicable when we consider that, in the first place, sugar is not the only substance that tastes sweet, but that a multitude of other substances, in no respect resembling it either physically or chemically, produces the same sensation in the organs of taste; and, in the second place, that still other substances, which are most nearly related to sugar, having even the same composition, generate either no sensation at all or produce one of a wholly different character. What, for instance, have sugar and a combination of lead with acetic acid in common that both should taste sweet? What sulphate of magnesia and quinine that both should taste bitter? What distinguishes sugar from starch that the former should produce a sweet taste, the latter no taste at all? No answer can be given, and we should but freight our page with useless verbiage did we give a list of all the substances having properties thus comparable. As regards other senses, that of sight, for example, we are in a better position. True, that even here we do not know in what consists the operation of light on the extremities of the optic nerve, whence result their excitation and mediately the sensation of light. But we do know, in the first place, that at those extremities there exists a wonderfully complicated apparatus in which we can recognize the intermediary between light and nerve, through whose agency the former becomes an adequate irritant of the latter; and we know, in the second place, by what momentum of the outward agent, light, the quality of the sensation is determined; it is practicable to state mathematically the degree of momentum adapted to each sensation. The undulatory movements of the luminous ether produce the excitation of the nerves of sight; the velocity of those movements qualifies the sensation so as to produce the colors which we see. A definite amount of this velocity is universally necessary for the production of the excitation; we are able to specify the smallest number of oscillations in a second of time which cannot be diminished, the largest number which cannot be increased, without producing in either case an extinction of the effect of the waves of light on the visual nerves; we are able, also, to state with entire certainty the unalterable number of oscillations respectively pertaining to the perceptions to which we give such names as red, green, yellow, or blue. So it is, also, with regard to the sense of hearing; what has just been said of the waves of light and their relations to the organs of vision and impressions of color may be transferred, with only verbal changes, to the waves of sound which produce the excitation

of the auditory nerves. Both these latter senses we propose to examine as exactly as possible hereafter, when the advantages which we possess for their analytical study in comparison with the sense of taste, and which are here only intimated, will be more thoroughly considered, and, we hope, more clearly evinced.

However unknown to us the properties which give to substances the power of producing sensations of taste and the way in which they operate on the nerves of that sense, it is, at least, some compensation that we know to a certain extent the conditions under which a substance empirically recognized as an object of taste exerts its specific power, and the circumstances on which the intensity of the impression depends. First stands the fact that a substance can produce no such impression unless it reaches the seat of this sense in a fluid form; if of a solid nature it must at least be first dissolved in the saliva. This condition results from the necessity, which was above provisionally assumed, that the sapid substance shall penetrate through the coat of epithelium to the mucous membrane. A solid body, even reduced to the finest powder, could not make its way through the closely compacted cells of which the covering of the tongue consists; but in solution it will be imbibed first by one and then by another stratum of these cells, until it finally reaches the underlying and sensitive surface. Now these successive imbibitions may be supposed to imply the lapse of a sensible interval of time, and yet experience teaches us that no interval can be appreciated between the moment of contact with the tongue and that of the ensuing sensation. Still, and in spite of this apparent contradiction, we must insist that no alternative remains for us but to accept this theory of a gradual transmission, seeing that it is supported by the admitted necessity of solution for producing sensations of taste, and no other supposition is possible. Moreover, we have no knowledge of the rapidity with which such transmission is accomplished, so that there is at least no proof that it may not be sufficiently great to render the interval in question quite inappreciable.

From what has been said it results that a body which is insoluble in water, and cannot therefore fulfil the above condition, is incapable of yielding a sensation of taste. We must take care, however, not to reason conversely that solubility in water is the actual quality which in itself fits a substance for the excitation of the gustatory nerves. That this is not the case obviously follows from the fact that many substances readily soluble in water are tasteless—nay, that water itself is so. Were solubility as directly the condition of taste as the undulations of the luminous ether are the condition of sight, a substance to be more sapid—that is, capable in smaller quantity of conveying a more intense sensation—should be the more soluble; but this common experience refutes. Extremely soluble bodies sometimes convey a very faint taste; others, soluble only with difficulty, an intense one. The degree of concentration of the solution requisite in general to produce a sensation of taste is very different with different substances; while some act in a very diluted state, others require a concentration nearly equivalent to saturation. It has been elsewhere stated* that as regards odorous substances, a scale has been established by experiment showing the degree of impregnation of inhaled air, requisite in the case of different articles for the production of a sensation of smell; and in like manner it has been attempted experimentally to assign values to the different degrees of dilution which different objects of taste will bear, without thereby losing their property of gustatory excitation. The numbers thus found afford of course no absolutely exact valuation, but as a general appreciation they furnish in this respect a sufficiently accurate comparison of the different substances submitted to trial. We will not withhold from our readers some of the results. It would perhaps be scarcely supposed that sugar rates unfavorably in this scale of values—indeed, the most unfavorably of the compared substances as regards their relative capacity for dilution without loss of taste. Solutions of sugar which contain less than one part of sugar to 99 parts of water, no longer excite any perceptible

taste of sweetness. Common salt bears a somewhat greater degree of dilution; the universal remedy for intermittent fever, quinine, remains perceptible under a much greater degree, while sulphuric acid (oil of vitriol) takes rank before all; water, in which only $\frac{1}{10000}$ part of sulphuric acid is dissolved, still tastes perceptibly sour. Acid substances, as many readers both male and female will be able to certify from experiences gained in cookery, most readily impart their sapid qualities. On what conditions these surprising diversities depend, it is beyond our power to explain.

With one and the same body, the *intensity* of the sensation of taste which it excites increases with the progressive concentration of the solution; a law which needs no other proof than daily experience. As regards the comparison of intensities, it will be well to remember what was elsewhere said on sensations in general, and especially on those of touch; we have no measure by which we can estimate an impression of taste, so as to give it an exact numerical expression. If we test, one after the other, two solutions of sugar of different concentration, we cannot, if the difference is slight, decide which is the sweeter; we cannot say that one tastes half, twice, thrice, or tenfold as sweet as another with which it is compared. Though this by the way: the intensity of the sensation depends not alone on the degree of concentration of the solution, but on several other circumstances, whose agency is in part susceptible of explanation, in part not so. It is easily understood that the strength of the sensation increases in proportion as the surface is larger on which the solution operates, and the time longer during which it is in contact with that surface. Just as of two bodies of equal weight that seems to us to be heavier which presses on a larger surface of the skin, and thus gives excitation to a larger number of the nerves of touch, so the same solution of sugar will seem sweeter, if diffused over the whole area endowed with the sense of taste, than when merely a drop of it touches a circumscribed part of the mucous membrane. Thus the intensity of the sensation increases with the sum of the nerve fibres simultaneously excited, because the single impressions seem, in conception at least, to be in some measure combined with one another. The more intense effect produced by prolonged contact of the object with the tongue may be inferred to result from the penetration of greater quantities of the substance to the nerve extremities of the mucous membrane; and for this, too, an analogy may be found in the operations of the sense of touch. A hot surface seems less hot on transient than prolonged contact with the skin, from the circumstance, in the first instance at least, that time is wanting to conduct the particles of caloric in sufficient quantity through the cuticle to the ends of the underlying nerves. One of the most essential conditions for increasing the intensity of a sensation of taste consists in the friction of the solution against the surface of the tongue, or of the latter with the solution against the hard palate. This resource comes into play habitually in the act of taking either solid or liquid food, but we more particularly avail ourselves of it in tasting, with a view to a more accurate judgment of the flavor of any substance. In this case we do not content ourselves with laying the object of which we would form a judgment upon the tongue and quietly awaiting the sensation, but bring it by an incipient movement of deglutition to the hinder part of the tongue, and press this in turn against the hard palate. It is at the moment of this contact, produced by a movement which is indispensable in the act of swallowing, that the most vivid sensation arises, as every one may convince himself who pays attention to what occurs during the process of taking food. For further confirmation of the fact the following experiment may be practiced: Let the tongue be stretched out, with the mouth widely opened, so that the former can no where strike against the roof of the cavity, and a drop of dissolved sugar or vinegar be placed upon its surface, only a very weak sensation will ensue, with an instinctive effort to press the tongue against the palate, because we are unaccustomed, except by this means, to conduct the operation

of tasting. The sensation will instantly become stronger if, with the finger or a brush, we rub the solution upon the mucous surface of the tongue. Here, also, we are at a loss for any certain explanation; we can only remotely conjecture how the means spoken of serve to promote and intensify the excitation of the nerves of taste. It may be that the pressure and rubbing facilitate the intermixture of the solution with the salivary stratum which covers the membrane and its penetration among the cells of the epithelium, or that the pressure applied to the extremities of the nerves renders these more sensitive and excitable. This latter conjecture, we confess, though received with favor by some, has, in our opinion, little probability. So long as we know nothing of the means or the mode by which substances communicate sensations to the nerves of taste, all hypotheses on this subject must be air-built speculations. How a mechanical force, a compression of the nerves, can heighten their excitability, must be mere matter of conjecture, and finds for its support no analogy in the action of other nerves. We must be content, therefore, to consign this, with the many other questions which we have been obliged to leave unanswered, to the category of riddles, for whose exact solution we can only look to a perhaps distant future.

We know from experience that the sense of taste not only possesses a very different degree of delicacy in different individuals, but that, even in the same individual, its delicacy is sometimes more, sometimes less exquisite. The causes of this difference are not, in all cases, easily shown. It cannot be denied that a different degree of functional activity of the organs of taste may be innate; but to what parts of the organ the difference is attributable and what properties adapt this or that part to the reception of a keener impression, and its conversion into a more distinct sensation of taste, cannot in the present state of our knowledge be determined. It is but seldom that we observe in the organ of taste, the tongue, those gross and obvious defects which might lead us beforehand to infer an obtuseness of the sense, such, for instance, as a thick and corneous condition of the epithelium, perceptible rugosities, &c. In most cases of difference of fineness of taste in different persons, the cause is to be sought, not so much in congenital or casual deviations of the apparatus, as in diversities of cultivation, of education of the sense. It is a remarkable fact that, through judicious practice directed to that end, the operations of all our senses may be improved to an extraordinary extent, and the way in which this refinement is brought about by diligent and heedful usage, presents one of the most interesting questions of physiology. Is the mechanism of the organs of sense improved by use, or is it only that, with an unchanged condition of the original mechanism, more facility is acquired in understanding their operations? In other words, are material changes produced by use in the apparatus of the senses, or is it the immaterial principle of our nature which derives advantage from that use? Probably, both suppositions are, in a certain degree, true. It would be difficult to adduce direct proof of the improvement of the proper apparatus of the senses, but analogies, drawn from other physiological apparatus, give countenance to its possibility. A muscle becomes so changed through strenuous use, that not only are its powers of performance increased, but a higher activity of nutrition supervenes, and the number of its fibres, on which depends its strength, is also increased. The blood secretes more material applicable to the formation of such fibres in employed than in unemployed muscles; a muscle, indeed, precluded from all activity, ceases to receive nourishment and perishes through inanition. Perhaps also the *quality* of the nutriment supplied is improved by the exercise of the muscle, so that, without actual increase of the fibres, those already existing may be qualified for greater manifestation of power. Daily experience affords proof of the above. It needs but to compare the firm and prominent muscle in the arm of a smith with the flaccid, scarcely developed muscle in that of a recluse, the muscular leg of a cha-

mois hunter with that of a sedentary artisan. But there is often to be seen also, in individuals of spare habit, in whom there is outwardly no striking muscular development, a surprising strength and energy of the muscles, which would indicate the enhanced nutrition of those organs arising from continued use. The muscles, then, being susceptible of this improvement by use, what should forbid our inferring that the working capacity of the apparatus of the senses may, in like manner, be nourished to a higher degree of perfection by habitual exercise? But whether the whole result should be referred to habitual use and exercise, is extremely doubtful; for those, at least, to whom soul and nerve apparatus are not identical. While it may well be believed that an organ of sense may be improved to such a point by material treatment as to be more sensitive to related impressions, it would seem impossible to explain by a simply improved mechanism the vastly increased delicacy of discrimination acquired by practice in distinguishing different impressions or different degrees of the same quality of impressions. If we consider the soul as an immaterial principle, which is indeed consigned to the material organs for all its intercourse with the outward world, and yet is so far independent as to be capable of a different cultivation through the employment of the same unchanged organs, we may also assume that it first gradually learns to interpret and discriminate the permanent processes in the sensitive apparatus, and will of course make the greater progress therein, the greater its practice. We are here venturing, however, into a province where no ordinary sagacity is requisite to find a sure route, and to pursue it without stumbling upon prejudices or deviating into by-paths. We return, therefore, to our immediate subject.

Examples of the degree of delicacy to which the sense of taste may be trained by use need not detain us. Every one may find them among his acquaintances, and few probably of my readers are without a knowledge of some connoisseur in wines, who, from the taste of the precious juice, will undertake to pronounce the year and vineyard which were privileged with its production. Though in such cases there may be often pretence or self-deception, yet it is certain that the sense of smell and even that of touch afford, for these trials, a degree of succor to the sense of taste; even common parlance recognizes the "bloom," the "bouquet," or again the "harshness," of certain objects submitted to the scrutiny of the latter; still there remains for the share of the sense in question enough to secure respect for its educational capacity. It is not, however, in different individuals only that striking differences in the delicacy of the sense of taste occur; they present themselves from time to time in one and the same individual, as the experience of every one will testify. Thus it happens, not unfrequently, that a severe catarrh migrates from the pituitary tunic of the nose to the mucous membrane of the mouth, and occupies the latter to such an extent that, in a scarcely exaggerated sense, all taste may be said to be lost. In this uncomfortable state, food excites only the impressions of touch, often improperly confounded with what is called a "clammy taste," though in truth no genuine sensation of taste exists; with the exception, perhaps, of that generated by intensely sour or bitter objects, which still is scarcely more than a counterfeit of the sensation excited by the same objects in a healthy condition of the organ. In the same way loss or depravation of taste is a very regular concomitant of many disorders of the stomach and bowels, manifested in some cases by hebetation of the organ, in others by perverted sensations, as when, for instance, all substances leave a bitter after-taste. We may remark, finally, that very intense impressions of taste blunt the susceptibility for succeeding and weaker impressions of the same quality, whence after partaking of a sour salad, the wine bibber may smack his lips over the sourest products from the vineyards of Grüneberg; while, on the other hand, the sensibility to impressions of another quality seems to be exalted, so that after the enjoyment of a sweet confection, the least acidity causes the best wine to taste like vinegar. For these facts we can propose only superficial and fragmentary explanations. As regards the bodily

ailments above spoken of, it is safe to make of the more or less thickened and furred envelope of the tongue a scape-goat on which we may cast, in the first instance, the blame of the defective or vitiated sensibility to objects of taste. We may suppose, moreover, that in catarrh, exudations from the mucous membrane clog its tissues, and thus impair the irritability of the extremities of the nerves, or in some way embarrass the yet unexplained action of sapid substances on those nerves. But such an explanation or supposition does not carry us far. What really gives rise to the incidental perversion of the sensations in question, can scarcely be the subject of even plausible conjecture, so long as we know not the nature of that excitation which different substances produce in the nerves, so long as we are ignorant how a sweet or bitter taste comes to be generated. That after a sour substance, a sweet one tastes doubly sweet, the reader may be disposed to explain by the effect of contrast. This explanation we shall not in general contest, but most earnestly protest against the commonly received notion that a sweet and a sour taste are opposites of one another. Between two sensations of different quality, whether they belong to the same or different spheres of sense, there exists no *tertium comparationis*, and so nothing which will authorize us to regard them as opposites. It is just as unreasonable to consider a sour taste the opposite of a sweet one, as to attribute opposition to the sensations of a red and green color, or a shrill and a deep tone, as if the one stood in diametric relation to the other as a north or south pole. Could the two sensations be even assigned to external causes essentially antithetical, we should not be justified in transferring this character to the sensations themselves. These are incapable of all description; they admit not of measurement or division, and can as little be brought into the relationship of opposition as of numerical value.

We must not pass without at least a brief notice the *after-taste* or *tang*, although in truth its nature and causes are as obscure as those of the proper sensations of taste. This after-taste exists in a twofold manner. With some substances, the original sensation which they create continues of the same unchanged quality for a long time after they have been swallowed and been displaced on the tongue by other substances. With others, again, after the retreat of the sensation originally excited, another supervenes of quite different quality. Thus there are bitter substances whose taste is not to be got rid of, as it is commonly expressed; and on the other hand, sweet substances which create a bitter after-taste. When this after-taste is of like quality with the original sensation, it is not easy to decide whether it is of a purely objective nature, or in part, at least, subjective; that is to say, whether the action of the substance which generates the primary sensation itself persists as long as the after-taste endures, or whether, for some reason, the excitation of the nerves, or the activity of that central apparatus which operates directly on the sensorium and determines the nature of the sensation, continues even after the disappearance of the substance from the environs of the nerve extremities. Of the last there is no existing proof; the objective nature of the after-taste is, on the other hand, readily conceivable and capable of explanation in different ways. It is very possible that certain substances, having once penetrated into the mucous membrane, cling more pertinaciously than others to its structural tissues, without being removed, by absorption or chemical decomposition, from the vicinity of the nerve extremities on which, therefore, they continue to operate. The probabilities in favor of this origin of the after-taste are greater, the smaller the quantities of the substance necessary to produce the sensation. In the second place, it may well be supposed that there are substances capable of affecting the nerves of taste through the blood; indeed, it is certain that many "subjective" sensations of taste, which, from time to time, present themselves without any external cause, are in reality objective in the sense that substances conveyed from the bowels into the blood have been in such cases carried by the latter to the mucous membrane of the tongue, and thus reach the sensitive

extremities of the nerves of taste. The proof of this lies in the often-observed fact that, when intensely bitter substances have been swallowed in the shape of pills so well enveloped that they pass over the tongue without exciting the characteristic taste, that taste will nevertheless arise in the mouth after a certain time. As regards the second sort of after-taste, where its quality differs from that of the primary taste, we are again left in doubt how far it is objective, how far subjective. It is very possible that certain objects of taste suffer, within the mucous tissues, a rapid change or chemical decomposition, and in this altered condition affect the nerves of taste in a different manner than at first. But it is also conceivable that the different after-taste results from a spontaneous reaction of the nerve apparatus; a supposition, however, which admits neither of proof nor closer examination.

In like manner with the impressions of touch and smell, of which we have elsewhere treated, those of taste are regularly and unavoidably associated with *ideas* which mankind in general are apt erroneously to identify with the impressions themselves. On this head, our previous discussions authorize us to be brief. With the impressions of taste is immediately connected the idea of an external *object* as cause of the sensation, and with so little consciousness of the distinction between the sensation and the idea that we believe ourselves to be directly tasting the object as such, and impute to it the qualities of the sensation as a property. Thus every one speaks of sweet and sour substances as if the sweetness or sourness were a property of the substance itself, just as we speak of red and blue objects in the meaning that the color is a property of the object. Most probably we arrive at the idea of an external object as cause of the sensation of taste not through this sensation itself, but through the accompanying impressions of touch, which simultaneously enable us to form the idea of the *place* at which the gustatory impression takes effect. With sensations of taste are also connected ideas of pleasantness, unpleasantness, nauseousness, &c., which are in like manner erroneously confounded with the sensations. An impression on the organs of sense cannot in itself be pleasant or unpleasant. Further, it is often not the immediate gustatory impression which calls up the idea, for this idea may take its shape from mental associations previously established, or in part from simultaneous sensations of taste or smell.

The above is all that we have felt authorized by the present state of our knowledge respecting the physiology of the sense of taste to impart to the reader as worthy of his confidence. We might here desist, but it is, perhaps, proper to offer a few remarks in regard to the practical uses to which the sense of taste is adapted, even if the first considerations which present themselves, as was the case when we formerly treated of the sense of smell, may seem calculated to disparage its value as an endowment of the human or animal economy. In this point of view, it is a matter of indifference whether we ask, of what advantage is the sense of taste? or what was the design in endowing the organism with that sense? The answer to both forms of inquiry rests essentially on the same principles. It is customary to regard the sense in question as a *sentinel*, so to speak, of the digestion, stationed at the portal of the alimentary passages, to challenge the various articles which present themselves for admission, and to enable us to discriminate the hurtful from the wholesome. Nor is this view incorrect, only it is necessary, first, to assign the limits within which this sentinel may be trusted; and, secondly, to inquire how far its function is an independent one. It would certainly be disastrous for nutrition and health if we committed ourselves blindly to such a monitor as this; death from inanition or poison must lie everywhere in wait for us, if we resigned ourselves without reserve to its indications. The sense of taste is itself indeed no sentinel; the quality of a sensation of taste can, of itself, in nowise disclose to us whether a substance is wholesome or unwholesome, seeing that there are many tasteless substances which are the former, and not a few of the latter which are well flavored. The sense of taste is in this

respect only like the indications furnished by a clock ; we must understand the signification of the numbers of the dial plate and the movement of the hands if we would derive from the clock information as to time ; so we must learn by circuitous experiences to interpret the different qualities of the sensations of taste, if we would avail ourselves of them in the diagnosis of food and poison. It is difficult to say how we are determined to the choice of our first nourishment ; an impulse wholly enigmatical urges the new-born child to its mother's breast, nor must we imagine that we make any progress towards an explanation when we call this impulse an instinct ; that is only a word by which we supply our want of a clear idea. But whatever the nature of the impulse, a sensation of peculiar quality is imparted by the milk of which we are thus led to partake, and this quality, impressed upon the memory, serves us ever after for the recognition of that particular nutriment. And so with all other means of nutrition, whether instinct or experience may have taught us to recognize them as such ; the sensations excited by them impress themselves upon us, and, with each, an idea of the nature of the corresponding object. Thus we learn by the sensation to distinguish the objects, but in nowise do we learn from the sensations the significance of those objects as regards life and health. When we partake of food, the previously instructed sense informs us of the kind and quantity of its sapid ingredients ; it is upon our own experience or that of others that we found our judgment of their nutritious or noxious character. Unfortunately for the epicure, the antagonist ideas of pleasant and distasteful can in no manner be brought to conform absolutely with the two categories of food and poison ; many a culinary preparation of simplest flavor is an excellent nutriment ; many a delicacy, which tickles the palate to an exquisite degree, is either innutritious or positively hurtful. Finally, it is to be remembered that among the safest viands as the subtlest poisons there are some which are quite insipid, to which, therefore, the vigilance of the sentinel palate can by no possibility extend. These patent truths it is unnecessary to re-enforce by multiplied examples. What would it avail, indeed, to prove that a plain milk-porridge as much surpasses a truffle-pastry in nutritious properties as it falls behind it in savoriness ? We should make thereby as few proselytes as did the barbarous reformer who once set a whole community in ferment with the words, " Beer is poison."

IV.—THE SENSE OF HEARING.

We enter now upon a sphere of sensation in which we feel that we have a surer footing than when dealing with the enigmatical senses of smell and taste, because here we encounter an external excitant accurately known as regards its nature and laws, and this nature and these laws are already more or less familiar to the contemplation of a large number of readers. What perception of the senses is there which takes a deeper and stronger hold upon our inmost being than sound in its endless modifications and harmonious combinations, which, in its inexhaustible interchange of tones, is capable, if we may be allowed the expression, of more delicate and diversified shadings, especially when it reaches us in the living form of speech ? Even that small and unhappy number of human beings in whose inelastic natures music " finds no echo, strikes no responsive string"—even these are the willing slaves of sound, without whose availability as speech the intellectual commerce of mankind would indeed be reduced to narrow bounds and wretched expedients. If we consider the animal world, we recognize the same wonderful force, the same essential office of sound in hundreds of instances. The tones produced by the small fibrous tendons of the throat thrown into vibration by the breath, whether it be in the unmodulated

neigh of the horse or the resonant song of the nightingale—these tones, which, in some respects analogous to the speech of man, afford means for a certain degree of intelligent intercourse between animals, are utterances to which we often assign no meaning, or, in our narrow prejudice, altogether disregard as the expression of a psychical emotion. We are very far from intending to write a panegyric on the power of sounds, or to analyze with poetic circumstantiality the susceptibility of sensitive minds to the language of music; there needs but brief exposition to secure for the sense of hearing that high interest which naturally pertains to it. For without the sense of hearing, there is no sound, as without the sense of sight, no color.

We may safely assume that at least every educated individual has formed for himself some idea, however superficial, of the causes of sound; has learned, for instance, to consider the mighty tones of the organ as proceeding from the regular and tremulous pulsations of the air-columns enclosed in the pipes, which pulsations arise when the air compressed in the bellows is directed in a current towards the openings of the pipes; that the penetrating tones of the violin result from the vibrations communicated to the stretched strings by the bow, as similar vibrations are produced in the strings of the piano when struck by the hammer; that the tuning-fork resounds when its elastic branches of steel are thrown into vibratory motion by a blow against some resisting surface, &c. These visible vibrations, as the source of sound, are too obvious to allow us to suppose that there is any one not familiar with the fundamental facts of the generation of sounds. But though our task of exposition as regards the objective excitant of the nerves of hearing be on that account materially lightened, and we may limit ourselves to a discussion of the special relations of certain properties and modifications of this excitant to the auditory organ, yet we believe we do not err in imputing to many and perhaps most of the laity * a radical misconception in which they are only the more fortified by the received explanations on the nature and causes of sounds. This is a misconception so nearly unavoidable, so entwined with all our ideas, and, indeed, so much sanctioned by the language even of science, that it is a difficult matter for physiology to evince it to be such and to establish right conceptions in its place. Many will be able to surmise what misconception we mean, since we have already had occasion, in treating of other senses, to enter the lists against it; but, at the risk of being counted tedious, we must here combat it anew, and much fear that when we come to consider the sense of sight we shall not be able to spare our readers a repetition of our efforts to eradicate it. Every one says, and most believe, that the vibrating string of the violin or the pulsating air-column of the organ pipe itself resounds; this is a radical error. When we said above that without the sense of hearing there could be no sound, we did not mean that if no ear were present an externally existing sound would not be perceived, but, in the strictest sense of the word, that without the ear, without the excitable nerves of hearing, no sound at all would exist. The string only vibrates, it sounds not; the sound is not conveyed through the air from the string to our ear, and through this to our consciousness; *the sound originates in ourselves, is the sensation*, and hence an action of our own soul, which is the result of the vibrations of the string, but has nothing whatever in common with them. The string, by its oscillations, throws the adjacent particles of air into a corresponding oscillatory movement, this movement is propagated in the form of a wave from particle to particle, and when the particles next to the ear receive the undulatory impulse and are set in motion, they communicate that motion to what is called the tympanum of the ear, which is thus in turn made to vibrate; the vibrations of the membrane just mentioned are now transmitted through certain bones of the ear

* A term used by some European writers, French as well as German, and seeming to imply that the profession of science is regarded, in Fourierite point of view, as a sort of priesthood. Being convenient, it is here retained.

to a small reservoir of fluid, in which fluid again the undulatory movement is reproduced, and that peculiar excitation of the extremities of the auditory nerve bathed by this fluid is exerted, which hurries to the brain the mysterious current so often spoken of, and there, through the terminal apparatus of the nerve, gives rise to the phenomenon recognized as a perception of sound. Thus long is the chain of successive movements between their origin in the vibration of the string and their termination in the inscrutable process by which the result is communicated to the mind. As far as the nerves we can analyze these movements through their entire course: up to the tympanum with great exactness, inside of the ear with less precision; but the movement within the nerve and its result, the sensation, are two riddles, of which only the first affords some glimpses towards a solution, the second is, perhaps for all time, shrouded for us in impenetrable obscurity. We are just as little in a position to define the nature of a sensation of hearing, or any intrinsic and essential characteristic pertaining to it, as we are in regard to an impression of any of the senses; the utmost we can do is to designate by commonly received names the qualities of the sensations generated by certain causes, upon the supposition that the sensation itself is known to every one from experience and an idea of its quality impressed upon the memory. If we would more exactly describe the sort of sensation which we call "high" or "shrill," instead of any distinctive token of the sensation itself, we assign the nature and specific properties of the external cause which excites it; we designate a sound as of certain "pitch," according to the number of vibrations of the body producing it, or as of a certain tone, according to the kind and peculiarities of the object or instrument from which it proceeds, because we are, for the most part, incapable of giving an accurate physical account of the forms of the undulations on which the modifications of the sound are conditioned. The same holds good respecting the "strength" of the sensation; the sensation itself admits not of measurement, but we can measure the magnitude of the vibrations or the force of a mechanical arrangement for producing them. In general, and in relation to each of these qualities, the sound evades every attempt to analyze it, however distinctly the sensation may present itself to our consciousness, however vividly we may be able to represent it to ourselves without the presence of its exciting objective cause, however accurately a practiced ear may seize the finest shadings of the height, the tone and the strength of different sounds. It was necessary to premise these explanations in order to reduce what is proposed by of the following exposition to a proper standard. It is undoubtedly a legitimate problem for physiology to investigate the nature and origin of sounds in the exact sense which we have indicated, but, for the solution of this problem, it is wholly unprepared; the physiology of the sense of hearing, of which we shall endeavor to give a brief and intelligible sketch, can teach us at present nothing further than the ways by which, and the forms in which, those motions of matter, which physical science has shown to be the cause of the perception of sound, penetrate to the auditory nerves; the acoustical significance of the complicated apparatus with which nature has endowed our organism for receiving the impressions corresponding to those motions; and, lastly, the relation between the qualities of these external movements and the qualities of the sensations as indicated by certain epithets applied to them. We proceed to our task.

Deep within the skull, enclosed on each side by the so-called petrous bone, the auditory nerve spreads its peripheral extremities, secluded from all immediate contact with the air, which brings to us, in propagated waves, the sound-producing vibrations of bodies whether near or distant. Of possible ways in which pulsations of the surrounding air might be conveyed to the auditory nerve there are many; but one is suited beyond all others to this office, and alone affords, by an arrangement pre-eminently adapted to the conveyance of sound, an adequate guarantee for the arrival of even very weak undulations at the per-

ipient apparatus of the ear. Air-waves may communicate their impulse to all bodies, whether solid or fluid, on which they strike, producing in these bodies vibratory movements more or less intense according to the degree of their elasticity and other properties. They communicate themselves therefore to the external skin of the body, and might be transmitted from this to the underlying soft parts; thence again to the bones, and through these be finally propagated to the extremities of the nerves of hearing. But this mode is so imperfect that, were the air-waves to reach their destination only in this way, our perceptions of sound would be limited to cases of violent atmospheric concussion. These waves are not only transmitted with difficulty and greatly enfeebled in solid bodies not rendered elastic through tension, but, if not of such excessive intensity as to overcome all hindrances, their progression, in such bad conductors as the soft parts of the body, would gradually fail, like that of water in sand, before reaching the hidden recesses of the nerves. It would be otherwise, indeed, if we lived in water instead of air. The waves of sound propagated in water are much more easily transmitted to solid bodies, and must, in fact, pass through the corporeal integument of all aquatic animals endowed with the sense of hearing. It would also be quite otherwise if the vibrations of sound-producing bodies were conveyed to us through the medium of solid substances instead of the air. If we stop our ears closely, so as to obstruct in a great degree the passage, and thus oppose to the air-waves a resistance like that which would proceed from a corporeal surface similarly interposed, we shall hear no sound from a tuning-fork thrown into vibration at some little distance, even when the force of the undulations is increased by placing it on a resonant support. On the other hand, if we apply the vibrating tuning-fork to one of our teeth, we hear the sound in its full intensity, as probably most of our readers have experienced. The reason of this is clear: while in the former case the vibrations communicated by the tuning-fork to the air lose so much of their force by afterwards striking against a badly conducting surface as to be unable to reach the sensorium, in the latter, being communicated immediately to the tooth, they are readily transmitted by this to the surrounding elastic solids and bones of the head, by which last they are directly conveyed to the nerves of hearing. This transmission of sound through the solids and bones of the head even surpasses, under certain conditions, that which takes place in the ordinary manner by air-waves entering the ear, but only in the case when the distance between the ear and the vibrating object exceeds a certain magnitude, not, as some physiologists assert, under all circumstances. We hear a vibrating tuning-fork more forcibly if applied to the teeth than if held in the air at the distance of a yard from the ear, but the result is different if the instrument be held immediately before the entrance of the ear, as is strikingly shown by the following very simple and easily repeated experiment: If, after striking the tuning-fork, we bring it into contact with one of the incisors and wait until the sound, growing constantly weaker, is no longer perceptible, we shall hear it again if we remove the instrument from the tooth and hold it close beside the ear. But, apart from this, it is apparent that the transmission of vibrations through the bones of the head to the auditory nerve, would, of necessity, labor under so many embarrassments and be so limited in its employment, that, were this the only instrumentality through which we received the sensations of sound, our sense of hearing would lose all its importance as a means of intercourse between the mind and the outward world. Let us reflect how seldom it would be practicable, and in these rare cases how awkward, if we were obliged to place ourselves in immediate connection with any vibrating body by means of some solid conductor, a metallic rod or other; if, in order to convey the sounds of a violin, or the human voice, to our auditory nerve, a conducting apparatus must first be interposed between the sounding-board of the one or organs of the other and the solid parts of our own cranium. That we are almost exclusively limited to the air-waves as a

conducting vehicle between distant sounds and the nerve needs no special proof; wherefore we conclude that, of all conceivable passages by which sound-producing vibrations penetrate to the sensorium, that alone deserves physiological consideration through which undulations of slight intensity, or proceeding from distant objects, attain with facility the nerve of hearing.

It is this one passage, therefore—the passage through the outer ear or auricle, the auditory canal, the tympanum, the ossicles or small movable bones, the labyrinth, both osseous and membranous—to which we shall turn our special attention, while we accompany the vibratory movement communicated by the air-waves through all these several stations in the order in which we have named them. We trust that it may be in our power to convey a clear comprehension of the apparatus, in part so greatly complicated, which the vibrations have thus to traverse. In beginning, however, we are somewhat embarrassed by the doubt as to how far we may venture to presume our readers already acquainted with the nature and laws of those periodic movements outside of our organs of hearing, designated as vibrations and waves—an embarrassment which recurs in a different form with the popular exposition of each of our physiological divisions, since physiology in all its parts presupposes a knowledge of physics and chemistry as its basis. We have before expressed our belief that, of all departments of physics, acoustics is that respecting which some degree of information is most widely diffused; in declining, therefore, the long digression which any adequate acoustical introduction would render necessary, and confining ourselves to the physiological view of our subject, we shall hope to be excused if we refer any reader who may happen to be little familiarized with it to some popular treatise for the doctrine of sounds. For the sake of simplicity and clearness in our statement, we shall substitute, in place of an analysis of all possible sources of sound, a single concrete example of a *string* vibrating under conditions which give rise to the undulations whose destination in the organ of hearing it is our purpose to follow. We take for this purpose a stretched string, supposed to be at a distance of some feet from the ear and of such a degree of tension that, when made to vibrate by a smart blow, it executes in a second four hundred entire vibrations—that is to say, four hundred forward and as many backward movements, with a constantly diminishing magnitude of the path described by its several constituent particles, until it returns to a state of rest. In such a string, the movement of the individual particles lying behind one another in the direction of its length is of very different magnitude; those at either end, *a b*, by which the string is



fixed, are entirely motionless; those next to them towards the middle have a certain, but very small movement, being restrained by their fixed neighbors, and the amount of movement increases as the middle of the string is approached, until the maximum of movement is reached in the particle *c* situated midway between *a* and *b*. If, therefore, we set the string in vibration by pulling it by the middle as far as *c'* and then releasing it, it will oscillate between the two limitary positions indicated by the dotted lines *a c' b* and *a c'' b* and its position of equilibrium *a c b*, which it passes at each successive oscillation. The curvature which the figure presents on both sides of the central line is the necessary result of the differences in the movement of the particles as just described. With the continuance of the oscillations, the number occurring in a second of time does not change, depending as this number does only on the length and tension of the string; but it is otherwise with the magnitude of the oscillations; as these proceed, the particle *c* deviates less and less from the position which it occupied when at rest, the curvature becomes constantly weaker, and the string finally forms a right line, as before the impulse. Did there exist now no material medium between the string and our ear, were this space wholly devoid of air, the vibrations of the string would

have no relation to our auditory organ, could yield no sound; we should see, but not hear them. The sound, indeed, as we before remarked, proceeds not as such from the string, but is produced indirectly by the string through the action of its vibrations upon the organism of the ear; and for this mediate or indirect action there is needed a material medium with movable particles, a conductor capable of propagating the vibrations of the string by corresponding movements of its own constituent parts. How this propagation is effected by the air is easily shown. We must conceive the air, surrounding the string and filling the space between that and our ear, to be composed of infinitely small particles movable among one another, and we will suppose the ear to be placed on the side next to c' . If the string, now, be supposed to oscillate from the position $a c'' b$ towards $a c' b$, it drives before it the particles of air next to it; it is evident, too, that, were the air a firm and cohesive body, the string could not execute its movement unless it propelled in a mass the whole of the air lying in its passage. But as the air is an elastic compressible body, the string, instead of driving before it at once the entire mass, presses upon and condenses only the parts immediately next to it, these in turn press upon the neighboring parts, and thus the impulse is progressively propagated from one portion of air to another. When the string has arrived at its limitary position $a c' b$, the displacement of successive portions of air and the compression which attends it have been propagated to a certain distance, so that the air to that extent is in a compressed state, forming a *wave of condensation*. Did the string remain motionless at $a c' b$, then, while the movement of propagation was still continued among the particles at the further end of the wave, those nearest to the string would come to a state of rest, then the next, and so on, till finally all the particles in the first wave would cease to move, the last of them precisely at the moment when the condensation on the further side has reached the limit to which it was carried during the forward movement of the string—that is to say, when the wave of condensation has reached its full length. But the string stops not at its greatest convexity; it springs back by virtue of its elasticity, and again passing the line of equilibrium, forms just such a curvature as before, occupying the second limitary position $a c'' b$. During this recoil there occurs in the stratum of air lying to the left of the string, and which had been condensed by its forward movement, the opposite condition of rarefaction, because a void space is left behind the returning string which the air must occupy. The several particles of air follow the string, first, those immediately contiguous to it, then in succession those more remote, so that, as is readily seen, the direction of the movement which the particles now execute is the opposite of that which had taken place on the advance of the string, while the direction in which this movement is propagated from particle to particle is the same. When the string has reached the position $a c'' b$, the propagated displacement of the particles and the rarefaction attending it have extended through a certain tract on the same side with the previous condensation; the air within this tract is in a rarefied state, forming a *wave of rarefaction*, which, succeeding the wave of condensation, advances, like that, from space to space, and to the same distance. In the meantime, the string again springs forward, again compresses the particles of air before it, and in this way the wave of rarefaction is replaced by a new wave of condensation. Thus these waves proceed from the string to the ear in constant succession and regular interchange, alternating as often in a definite time as the string vibrates from side to side; and a particular particle of air, whatever its distance from the string, continues, as long as the string vibrates, to oscillate forward and backward according as it happens to be in a wave of condensation or one of rarefaction. We shall only add that the velocity with which the displacement of the particles of air is propagated always remains the same, no matter how great the number of the vibrations of the string, or how wide its excursions; and that the magnitude of the displacement of each several particle

depends on two circumstances: first, on the width of those excursions; and secondly, on the distance of the particle from the string.

The wider the vibrations of the string or the departure of c' and c'' from c , so much greater, of course, is the displacement of the nearest particles of air, and consequently of those which follow in succession. As regards the diminution of the displacement in proportion to the distance from the string, an example drawn from a different quarter will afford a simple and intelligible illustration. If a stone be thrown into the water, there arises a circular wave, which continues to recede on all sides from the centre of disturbance, and in this wave the elevation and depression follow one another in regular succession, like the condensation and rarefaction in the sound-producing waves of the air; but whereas, in the immediate neighborhood of the place where the stone fell, the elevations are high, the depressions deep, the former, though the width of the wave remains unchanged, lose their height, the latter their depth as they recede, until both are at length lost in the level expanse. Such is the case, too, with the air-waves; the magnitude of the displacement of the several particles diminishes in definite proportion with the increasing distance from the source of the sound, and at a certain distance, which is greater as the movement nearest the source, or, in the present case, the excursion of the string is more considerable, the displacement wholly ceases. If our ear be beyond this limit, it is not reached by the air-wave, and can therefore not perceive the vibrations of the string as sound; probably, indeed, the perceptibility of the vibrations ceases within that limit, for it is little likely that, when the movement of the particles of air has become very slight, it should any longer have sufficient intensity to excite the terminal apparatus of the organ of hearing. At the distance of a few feet supposed, in our example, to intervene between the ear and the string, even weak vibrations reach the ear with sufficient intensity, the particles of air next the organ driven at the assumed rate of 400 forward and 400 backward oscillations in a second, forming, with the requisite distinctness, the alternating waves of condensation and rarefaction. Let us now inquire the operation and destiny of these waves in the organ itself.

The part of the ear which is first struck by the air-wave is the auricle or pinna, constituting the external organ, in regard to whose structure and arrangement every one may easily satisfy himself. This external portion presents a sort of hollow shell with several eminences and channel-like depressions, the base of the shell containing a funnel-shaped cavity which opens immediately into the inner passages of the organ. In the lower animals the whole ear has, for the most part, more of the funnel, or, at least, spoon-shape, and is in general much more movable than in man. The human ear is, however, by no means immovable; the reader will scarcely fail to have met, in the course of his life, with some wonder-worker, who, with more or less skill, pretends to the power of wagging his ears. This egregious accomplishment, be it known, is cheap; the ear of every one is provided with several muscles, which proceed in different directions from its base to the surface of the skull, and which, by their contraction, may change the position of the auricle; to these muscles are distributed nerves, whose relations to the brain and the will are like those of the innumerable other nerves, and which are capable, therefore, of communicating motion to the muscles. But just as the deaf-mute possesses the same muscles and the same nerves of volition with him who articulates, and has only not learned to use them because for him the natural instructor, the sense of hearing, is deficient, so it is no absence of the original power but a neglect to use the muscles of the ear in early life, which, in most men, leaves that member incapable of voluntary motion. It may sound strangely, but still is true, that for this neglect the blame lies in the tasteless as well as injudicious custom of muffling the heads of infants in caps, by which the ears are so long kept immovably bound to the head, and precisely at the time when the soul is getting acquainted with its bodily machine,

and learning to use it. Crying, speaking, handling, the child learns, not experimentally and with any purpose of the will, by setting in motion the muscles of the throat and thorax, the arm and the hand, to try the effect and benefit which may result. The soul never arrives at a direct perception of these special members, not to say that the knowledge of their existence and of the means of setting them in motion would be the prerequisite incitement to their use. That primary incitement consists much more in the activity of the muscles themselves; the child cries at first mechanically—that is to say, its vocal muscles are thrown into action in a reflex way, the muscular irritation being the effect of the irritation of the nerves of sensation in the brain produced by an external object. With this activity is connected a determinate, and for every muscle a specific feeling, a so-called muscular feeling, of which the child becomes conscious, as it does at the same time of the sensation of sound which is the result of the activity of the vocal muscles. Thus the child first learns that this specific muscular feeling always coincides with that sensation of sound, or, again, that with the muscular feeling which the movement of the arm produces, is associated a sensation of pressure when the limb encounters an external object, which object may at the same time give rise to a visual sensation, &c. The education of the soul thus proceeds step by step, and in this way it very gradually succeeds in obtaining an indelible idea of all possible combinations of the muscular feelings, and in understanding their signification from the consequences experienced, so that it knows exactly what sort and degree of effort the will must make, in order to call forth any definite muscular feeling, and attain the results known to be associated with it. The same circuitous process would lead to the conscious use of the muscles of the ear if their unconscious reflex activity were at first possible, for this would be our instructor by means of the associated muscular feeling and the knowledge of its consequences. Respecting this, however, it is enough to say that the detriment occasioned by the defect of motion is not great, since the human head is in the highest degree movable in all directions, and hence we can well dispense with any movement of the ears. The purposes connected with a change of position of the ears will presently be noticed.

If we ask now what function the outer ear fulfils, in what acoustical relation it stands to the air-wave, the common answer is at hand: to intercept and receive it; but this is by no means an exhaustive explanation. It is true, indeed, that this member is an auxiliary but not an altogether indispensable part of the auditory apparatus, since it is well known that, where it is wanting, not only does the perception of sound exist, but that often it is not sensibly weakened or affected. The same is the case if the external ear be occluded by filling its cavity with some pulpy inelastic substance, while the auditory canal, and that alone, is kept open for the transmission of sound by the insertion of a small tube. But although the auricle is not indispensable, it is not in vain that it occupies its place. Its design may be sought in a two-fold relation to the sound-producing waves of the air: these may rebound against it, as the light is reflected from a mirror, and by means of its different eminences and depressions be thrown in greater quantity into the interior passages; or it may serve as a sort of sounding-board, or, more correctly, as the bridge of a violin—that is to say, receiving the wave of sound and, being a rigid, elastic, outstretched cartilage, it may itself be thrown into vibration, and through the walls of the auditory canal communicate that vibration to the tympanum, as the bridge of the violin transmits the vibrations of the strings to the sounding-board. In both cases the advantage would consist in economizing a part of the air-wave which would otherwise be lost. It was usual, formerly, to seek in the action first mentioned, the reflection, namely, of the wave into the auditory passage, the service of the outer ear. By more careful consideration, however, of the directions in which, according to physical laws, waves of sound, striking in different lines upon its differently shaped parts, must be reflected, the auricle is shown to be very little

fitted for this purpose, since it gives no direction to the incident waves by which any important portion of them can be thrown into the auditory channel. If we would convert the auricle into a reflector, we must resort to a very usual means of overcoming any difficulty of hearing by bending forward its free cartilage with the hand, while at the same time the hollow palm of the latter is extended to increase the capacity of the cavity. In this way the auricle with the hand acts as an ear-trumpet in collecting the waves of sound and throwing them thus condensed into the ear. In its usual posture, on the other hand, the chief service of the auricle is to be sought in the second of the above-named relations: on the impact of the air-waves, it is itself fitted to take up the vibrations and convey them through the intermediate structures to the tympanum. The communicated vibrations will, from physical laws, be stronger in proportion as the direction in which the air-waves strike is more perpendicular, but as the auricle is not a level surface, and, at different points, is struck by the same air-wave in different directions, it is more exact to say that its conducting capacity will be greater, the larger the portion of its surface opposed perpendicularly to the air-wave. If the source of the sound is in front of us, so that the waves are directed perpendicularly towards the face, they will evidently strike the right and left ear under equal conditions. In this case it is plain that the ears are not in the most favorable position for the entry of the air-wave into the auditory passages, since, on each side, these cross the direction of the wave at right angles, and there is, besides, a projecting lobe in front which forms a sort of screen to the entrance; still the auricles are not unfavorably situated as regards the direction of the waves, since a large portion of their cavity is turned almost perpendicularly to that direction, at least in persons whose ears stand out somewhat from the head and do not form too small an angle with its side-walls. In this way we may account for the conclusion experimentally arrived at by one of the older physiologists, that the perception of sounds is most distinct if the auricle forms an angle of 40° with the lateral surface of the head; the most favorable angle for all directions of sound there are no means of determining. If the source of sound, instead of being before, is on one side of us and in the direct prolongation of one or other of the ear-passages, the conditions are of course different. The ear of the corresponding side has then evidently the advantage, inasmuch as the entrance of the wave into the auditory canal is here direct, while on the averted side it is circuitous; nor does the auricle, in this case, present itself in a wholly disadvantageous position to the undulations, since no inconsiderable part of its surface, though a different one from the former, is now more or less perpendicular to their direction. That, on the whole, the conditions for the access of the waves are more favorable when they strike the ear laterally rather than directly in front, is evinced by the fact that, in earnest listening, we unconsciously turn the head laterally, so as to bring the axis of one of the auditory canals into the direction of the sound. The above is all that can be said respecting the significance of the outermost structure of the organ of hearing, and is little enough, if we consider how freely it lies open to observation and the exact knowledge we possess of the nature of the undulations.

The next part to be traversed by the sound-producing air-wave is the auditory canal (*meatus auditorius externus*) which leads from the bottom of the concha or cavity of the external ear to the seat of the finer apparatus of the organ. This canal, which is about an inch long, is not straight, but somewhat bent, nor is it everywhere of equal width; its walls are covered with the viscous secretion called ear-wax, and, especially at the entrance, are overgrown with small hairs. The function of this part, in a general point of view, is clear, though some obscurity rests upon certain special details—that is to say, we know that this external meatus, partly through the included air-column, partly through its own elastic environment, conducts the waves of sound to the interior of the organ; that on account of its curvature and varying width the waves must, in

their passage, strike against and rebound from its walls, so that none can reach the tympanum in a quite direct and unbroken line; further, we may conjecture that this reflection of the air-waves from the walls gives them additional force, on the same principle that the rebound from a vaulted surface is known to strengthen sounds; but we are not in a position to determine the course of each wave in this tube with so much precision as physics might desire. The hairs at the entrance are an important protection against the intrusion of foreign bodies, especially particles of dust, which, at least to a certain extent, is thereby prevented. Respecting the true use of the ear-wax there is still a question; the covering of the walls with a glutinous substance would be judged *a priori* to be detrimental to the conducting capacity of the tube, as too great a secretion and accumulation of it are in fact found to be. A recital of the conjectures which have been formed on this subject may well be spared.

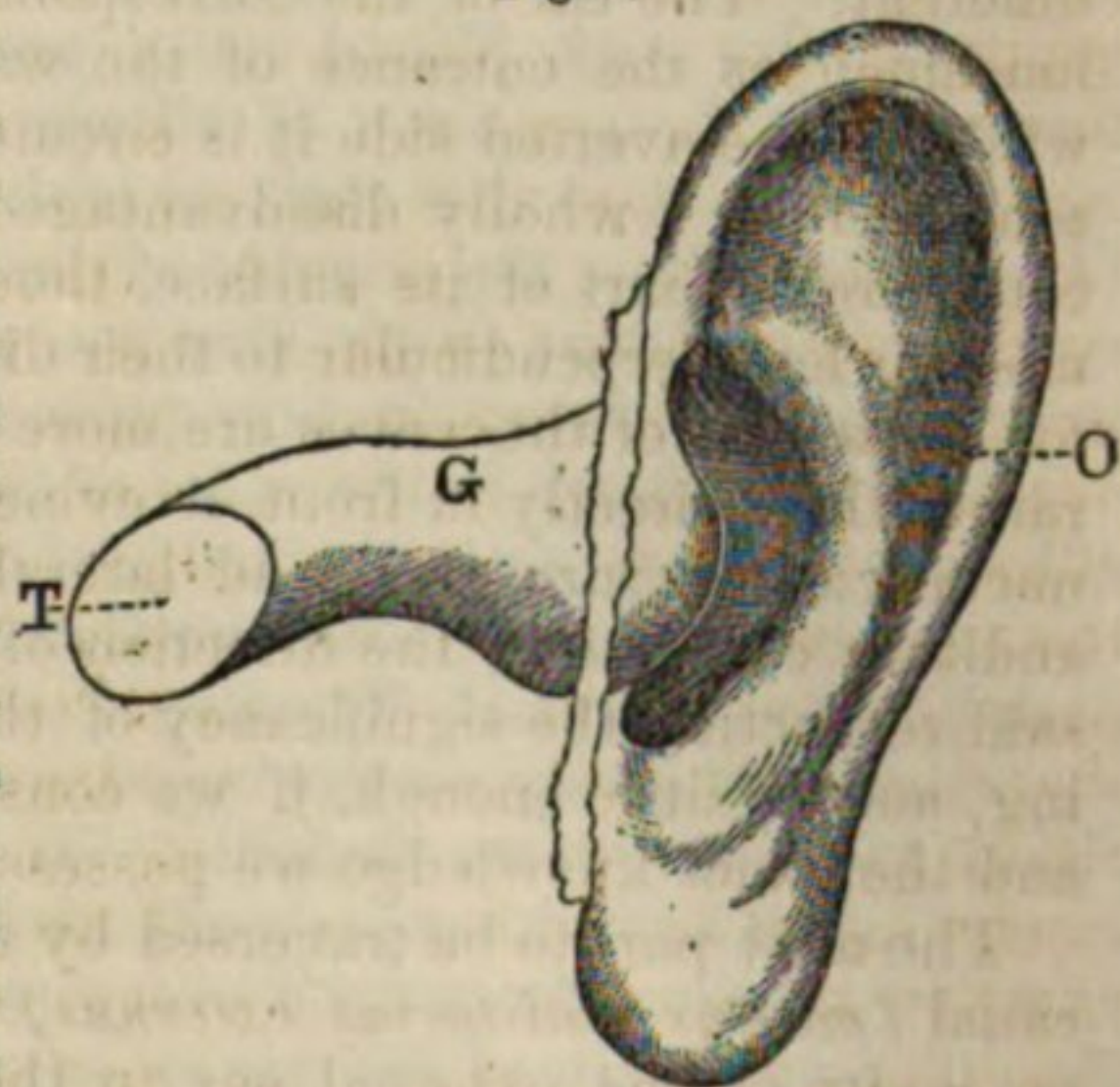
We come now to a very important part of the apparatus for conveying sound, the *tympanum*, and its connection with the reservoir of the nerves by means of the *ossicles of the tympanum*, a chain of small movable bones. In order to give the reader a correct idea of this mechanism, it is indispensable to convey as clear a conception as possible of the anatomical arrangement, form, position, and adjustment of its several parts; an undertaking which would be easy had we before us, for the purposes of demonstration, either preparations from nature or artificial models, but which presents no inconsiderable difficulty when it is to be accomplished by means of description and mere delineations.

The tympanum is a delicate membrane, which is stretched like the head of a drum over the inner extremity of the auditory canal, and forms a wall of separation between that passage and a small interior cavity, known as the *cavity of the tympanum*. This membrane is not placed perpendicularly, but obliquely, in such manner that its exterior surface next the canal looks obliquely downward, and at the same time somewhat backward, to the floor of the canal, while the interior surface, turned towards the tympanic cavity, looks upward and somewhat forward. The auditory canal is thus obliquely cut off at its inner extremity, its floor or lower wall being longer than its roof or upper wall, the hinder wall somewhat longer than the front one, the cavity of the tympanum lies more above than behind that membrane. The annexed

Fig. 2.

figure represents the outer ear O, the auditory canal G, and tympanum T, of the right side, seen directly in front. In order to place the membrane of the tympanum in open view, the ossicles connected with it are left out, and for the same reason the outline of the cavity is not given. But the membrane of the tympanum forms not a plane surface. It is arched in the direction of the cavity, so that its outer surface is concave, its inner convex, while between the two layers of which it is composed the handle of the malleus, a small bone, to be presently described, descends from the upper edge as far down as the middle, where it is firmly attached, and, by its position, gives to the whole membrane the curvature which has been just mentioned. If we imagine a stick firmly affixed to the centre of a drum-head, while the other end projects over the rim, and that a force is applied to this outer and movable end, so that the skin of the drum is at once stretched and pressed inward, we shall obtain some idea of the arrangement of the malleus and the tympanum.

Let us examine now the action of the sound-producing undulations, the before-described waves of condensation and rarefaction on the membrane in ques-



tion. It is apparent that this will be thrown into vibration, and that its vibrations will exactly accord in intensity and number with those of the air-waves, and mediately also with those of the body by which the latter are set in motion. Each wave of condensation, the several particles of which are pressing forward in the direction of the wave, will communicate to the particles of the tympanum the same movement, and therefore increase its inward curvature, and at the same time its tension; and each wave of rarefaction—the direction of the particles being now opposed to the general movement of the wave and away from the tympanum—draws the latter, in a certain measure, after it, and the vaulted membrane is correspondingly flattened towards the external air passages. It has been a subject of controversy, in a physiological point of view, whether the movement impressed on the tympanum by the waves of sound, be, like that of the string before described, a normal, vibratory movement, or an undulatory one like that produced by alternate impulsion and retrogression in any fluid, as, for instance, the air. Without entering further into this question, the discussion of which would involve an analytical inquiry into the doctrine of undulations, we shall only remark that, in our own opinion, the tympanum of the ear can, under no circumstances, execute any other movement than vibrations of the former order. If we deliver a smart blow on the head of a real drum it is evident that the elastic membrane will be driven inward in a convex or dome-shaped curve, since here, as in the string, the middle particles are most movable; those lying nearer to the rim are less so, while those immediately at the rim, over which the skin is stretched, are immovable, like the points at which the string is attached. By thus bending inwards, the tension of the membrane is necessarily increased, wherefore the inward bending can only proceed to the point at which the elastic force of the increasing tension finds itself in equilibrium with the force which has been applied from without; when the impulse of the latter gives way the elastic force drives the membrane back, as it does the thread, not to its original plane, but with such velocity that it passes that line and is now curved outwardly, until again arrested by the increasing tension and again driven inwardly. Thus the membrane with which the drum is covered continues to oscillate inwards and outwards with diminishing curvatures, until the whole movement subsides to rest. Now, the membranous tympanum of the ear is placed under precisely similar conditions, and must therefore execute the same sort of vibrations; its particles are not at all movable in an equal degree, so that each, as is the case with the particles of the air, can, in like degree, follow the impulse of the air-wave, the movement of each being exclusively dependent on the direction and force of the impelling particles of that wave; on the contrary, in consequence of the adhesion of the membrane throughout its whole circuit to the walls of the auditory canal, the particles next to the adherent edge are, as in the artificial drum-head, immovable; those at the centre the most movable; the intermediate, movable in a progressive ratio from the periphery to the centre. The magnitude of the movement of each particle depends, therefore, not merely on the impulsive force of the air-waves, but also on its position and consequent mobility. If we represent to ourselves an air-wave of condensation as striking perpendicularly upon the tympanum and simultaneously exerting an equal force upon every particle of the membrane, it is evident, from the different degree of resistance opposed by the several particles—a resistance which increases according to the distance of each particle from the centre—that the result of the impulse will be a convex flexion of the membrane towards the interior cavity. Upon the same principle the succeeding wave of rarefaction will be followed by a similar flexion in the opposite direction. If no wave of rarefaction followed the wave of condensation, the tympanum, when the impulse of the latter was withdrawn, would still spring back through its own elasticity, and undergo, like the drum skin, after one blow, a series of alternating vibrations around its line of equilibrium, the velocity of which would depend alone on the

size and tension of the membrane. But with alternate waves of condensation and rarefaction, the tympanum vibrates only under their influence, and as these vibrations will be exactly synchronous with those of the string, which, in our previous example, we supposed to be the source of sound, their number in a second of time will, in like manner, be four hundred inwards and four hundred outwards. The form of the vibrations remains the same; whether the magnitude of the displacements of the particles of air in contact with the tympanum be great or small, nothing changes with that magnitude but the depth of the resulting curvatures. If the air-wave does not strike the whole surface of the tympanum perpendicularly and at the same time, but impinges obliquely by striking first a part near the edge, a convex curvature ensues, but its form will be somewhat different. Though this be commonly the case on account of the oblique position of the tympanum to the auditory canal, we will not enter into a closer analysis of the different forms of curvature which would result from this circumstance, since nothing is thereby essentially changed, and the following explanations will be rendered more generally intelligible by being made in reference only to the simplest form of vibrations.

If we ask now to what end a tense and elastic membrane is interposed in the passage of the waves of sound, why these are not propagated as air-waves to the perceptive apparatus of the auditory nerves, the answer is simply as follows: The ends of these nerves are suspended in a fluid, and for obvious reasons must be so; hence the question first concerns the communication of the waves to this fluid. Did the air-wave immediately strike the fluid the transmitted impression would be extremely feeble, so that weak or remote vibrations, which, under the existing arrangement we hear distinctly, would be no longer perceptible. Besides, it is not easy to see how such a direct transmission of the waves of sound from the air to the fluid could be effected, since a free surface accessible to the external air would be incompatible with the safety of the tender nerves. It is imperative, therefore, that the fluid be enclosed within solid walls; but walls of osseous structure take up the vibrations of air with as much difficulty as fluids, and would transmit them in the same weakened condition; hence there was needed some other and suitable medium between the air and the aqueous secretion. Now this purpose is fulfilled in the most perfect manner by the system of small bones appertaining to the tympanum. Air-waves are with difficulty transmitted immediately to solid bodies, but easily and with intensity to stretched membrane; and when, in this way, the membrane has been thrown into oscillatory movements, as above described, these movements are readily communicable to solid bodies—a fact of which every one may satisfy himself by the following simple experiments: Over the opening of a glass or a tube let a dry membrane be stretched, whether it be of bladder, leather, or mere paper, and let this membrane be strewn with fine sand; if a tuning fork, which has been made to vibrate by a strong blow, be held at a little distance above the membrane, the lively vibrations into which the membrane is thrown by the air waves proceeding from the fork will be manifested by a saltatory movement of the grains of sand as they continue to bound upwards and fall again on the vibrating surface. To show the facility with which vibrations of the membrane are transmitted to solid bodies, let a metallic ring, such, for instance, as is used for keys, be clasped round with the thumb and forefinger of the left hand, while, with the right a strongly vibrating tuning fork is held close above it. With the simple ring not the slightest motion will be felt, but if a membrane be previously stretched upon it and the experiment be repeated in the same way, the ring will be felt to vibrate in the most sensible manner as long as the vibrating fork continues in its vicinity.

We now know how the air-waves are received by the membrane of the tympanum; let us next see how this membrane communicates its vibrations to the chain of small bones behind it, and in what way these in turn set in undu-

latory motion the fluid contained in the so-called labyrinth. It is no very easy matter to make the structure, position and connections of the system of small bony levers interposed between the tympanum and the labyrinth perfectly clear; we shall endeavor first to exhibit the principle of the arrangement by means of some illustrative delineations: Fig. 3 represents the simplified form of the apparatus seen in perspective; Fig. 4, an ideal vertical section thereof. A little rod of some length $a b$, which bears at its upper extremity a knob b , is by its lower

Fig. 3.

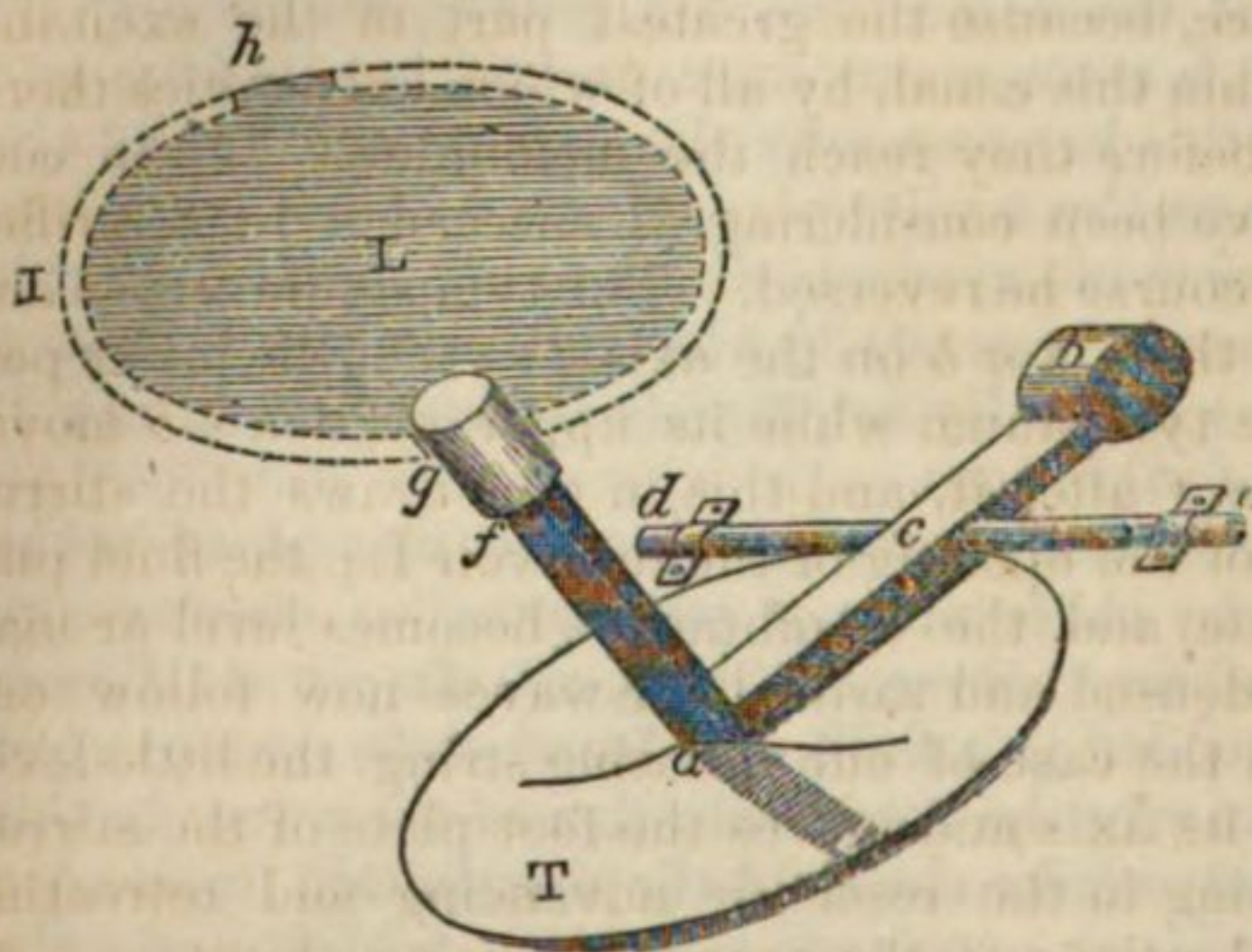
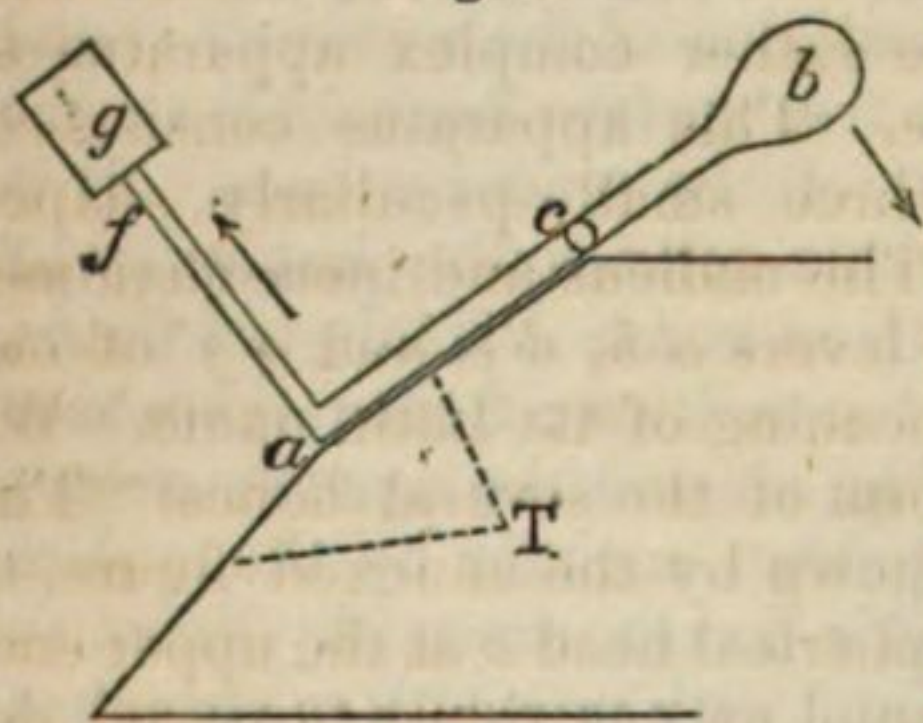


Fig. 4.



half $a c$ attached to the stretched membrane of the tympanum $T r$, in such manner that it reaches from the upper edge directly to the middle of that membrane, thus dividing the upper half of it into two equal lateral portions, while the upper half of the rod with the knob projects freely into the cavity of the tympanum. Through the middle c of the rod, and crossing it at right angles, (in Fig. 4 supposed to be perpendicular to the surface of the paper,) passes a solid transverse rod $d e$, both ends of which are so secured by ligaments to the bony wall of the cavity near the border of the tympanum, that this transverse rod can turn upon its own longitudinal axis, but not be otherwise displaced. We may imagine both ends surrounded by annular ligaments which are tightly fastened to the wall of the cavity. The lower end a of the longer rod bears a short arm $a f$, with which it forms a right angle, and which is perpendicular to the surface of the membrane of the tympanum. The free end f of this arm bears finally a stirrup-shaped appendage g , firmly articulated with it, whose footplate is fitted like the piston of a syringe into an oval window-like opening of the reservoir L , (the labyrinth,) containing a fluid; with the edges of this reservoir the appendage g is united by a membranous and very elastic border. The action of the vibrations of the tympanic membrane on this apparatus must necessarily be as follows: If the membrane be driven inwards by a wave of condensation so that its curvature, as shown in Fig. 4, is increased and its centre a be thus brought nearer to the reservoir L , the rod $a b$ must follow the movement and turn around the transverse rod $d e$ (which serves as its axis of revolution) in such manner that the part $c a$ below the fulcrum c moves inwards and upwards with the tympanum, while the upper part $c b$, projecting into the cavity, moves outwards and downwards, as is indicated by the directions of the arrows in Fig. 4. The rod $a f$, attached rectangularly to the former, will thus be lifted up in the direction of the arrow proceeding from a , whereby its stirrup-like appendage g will be thrust deeper into the reservoir, and the elastic border by which it is united to the edge of the opening will undergo extension. The fluid in L receives this external pressure and is propelled before it. Were the walls of this reservoir rigid and unyielding throughout its whole circuit the fluid could not give way, and, since a fluid is compressible only by strong force, while that of the air-wave is relatively small, the resistance thus opposed would render the entrance of the appendage impossible, and mediately also the whole movement of the apparatus and the tympanum. In order, therefore, that the external

action may take effect, the reservoir is provided with a second opening *h*, which is closed with an elastic membrane, (*membrana tympani secundaria*.) In proportion as the stirrup-plate is pressed deeper into its opening, the yielding fluid drives the membrane *h* before it, bending and stretching it outwards. We shall see hereafter that, in nature, this reservoir of fluid consists of a sac-shaped space in which is the opening for the stirrup or *stapes*, and of a long spirally convolved canal; the other opening *h* lies at the extreme end of this canal, so that the movement of the yielding fluid, propagated from particle to particle, must traverse the whole canal before it arrives at the elastic membrane. This extensive circuit is of the utmost importance, because the greatest part of the excitable nerves have their extremities within this canal, by all of which extremities therefore the liquid waves must pass before they reach the membrane. If the condensed wave, whose effect we have been considering, is succeeded by a rarified wave, all the movements will of course be reversed. The tympanum recoils and oscillates outwards, thus turning the rod *a b* on the axis *d* so that the lower portion *a c* moves outwards with the tympanum while its upper portion *c b* moves inwards; the portion *c a* draws *a f* after it, and this in turn draws the stirrup *g* in a corresponding degree out of the opening of the reservoir *L*; the fluid pursues the withdrawing stirrup-plate and the membrane *h* becomes level or may even be drawn inwards. If condensed and rarified air-waves now follow one another in rapid succession, as in the case of our vibrating string, the little lever *a b* turns with equal velocity on its axis and moves the foot plate of the stirrup in its opening up and down, causing in the reservoir advancing and retreating waves, equal in number to the vibrations of the sound-producing object.

After this general representation of the scheme and action of the mechanism, it will not be difficult to comprehend that of the rather complex apparatus of the ossicles of the tympanum in its actual state. This apparatus consists of three members connected with one another—three small, peculiarly shaped bones—the *malleus*, the *incus*, and the *stapes*. The malleus and incus (hammer and anvil) together correspond to the system of levers *a b*, *d e*, and *a f* of our scheme, the stapes to our stirrup, which is the meaning of its Latin name. We

Fig. 5.



will first consider the form of the several bones. The malleus consists, as is shown by the annexed figure, of a handle *a b* and of a spherical head *c* at the upper end. Beneath this head is found on one side a grooved depression running obliquely around the neck from above downwards, into which a corresponding surface of the incus is fitted; on the other side proceeds from about the middle of the bone a long and slender outgrowth or projection *e f*, running to a point, corresponding to the portion *d c* of the transverse axis *d e* in the previous figure. The incus much resembles a bicuspid tooth with widely separated roots. It consists of a short, thick body *a*, whose upper surface *b* is of an oval shape and

Fig. 6.

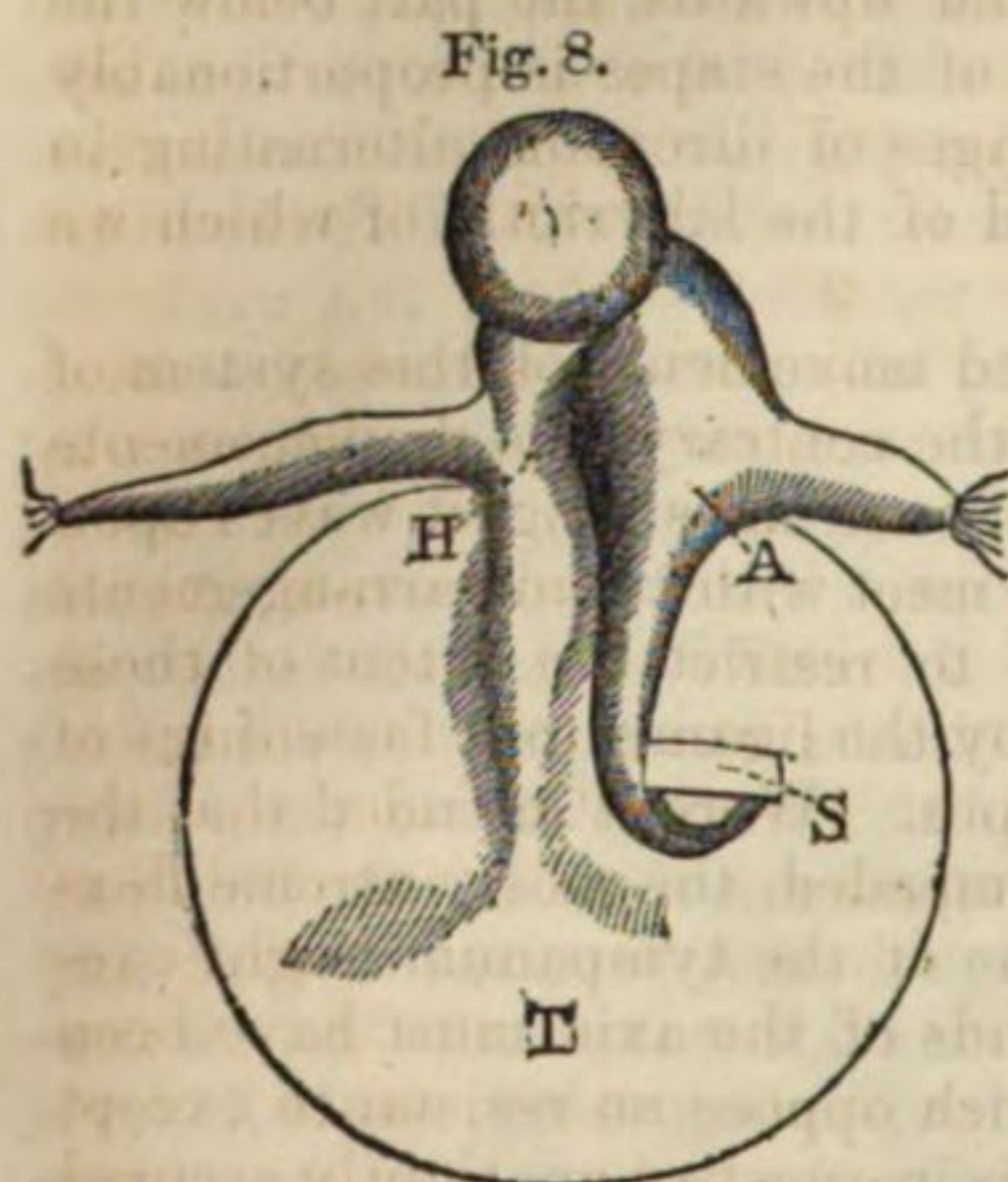


is so channelled out as to be concave in a longitudinal and convex in a transverse direction, fitting accurately into the depression at the neck of the malleus. From the body *a* proceed, nearly at a right angle with one another, two processes, one short and thick, *c*, the other, *d*, long and somewhat bent towards its extremity, on which it bears a small lens-shaped bone *e*. With this terminal bone of the incus articulates the head of the stapes, whose form corresponds to its name; it consists of a head, two divergent branches unequally bowed, *a b*, and a flattened oval-shaped plate *c* which forms the base or foot of the stirrup. The position, ligature, and connection of these bones with each other, the tympanum and

Fig. 7.



the labyrinth, is as follows: If we imagine a human head vertically divided in the middle from front to rear, and from the right half all the parts, both solid and soft, to be removed until we arrive at the cavity of the tympanum and thus bring to view from within the apparatus of the right ear with the membrane of the tympanum, the appearances presented to us, when we look a little obliquely



from above, will be those represented in the accompanying figure. *T* indicates the tympanum, *H* the malleus, *A* the incus, *S* the stapes. The handle of the malleus is firmly united to the membrane of the tympanum, being inserted between the two soft layers of which the latter consists and extending from the upper border to the centre, so that, like the rod *a c* in the schematistic figure, it must necessarily follow the movements of the membrane. The neck and the heavy spherical head of the malleus project freely over the border of the membrane into the cavity of the tympanum; the long projection, on the other hand, runs, at the height of the upper border of the tympanum, forward, and is here tightly fastened, by one of the short, elastic ligaments which spring from its point,

to the wall of the cavity. The neck of the malleus articulates with the summit of the incus, the two surfaces being reciprocally adapted to one another, and their edges secured by a capsular ligament which permits but slight displacements. Through this arrangement the short, thick process of the incus is in such a position as to form a right line with the long projection of the malleus, being directed transversely backward as the former forward, and is fastened to the hinder wall of the cavity by a sort of capsule which allows of its turning on its longitudinal axis. The long projection of the malleus and the short process of the incus answer therefore together to the transverse axis marked *d c* in the first delineation, around which turns the little rod marked *a b*. The longer process of the incus runs parallel to the handle (*manubrium*) of the malleus, from which it is separated by a small interval, its course through the cavity being rather more inward and backward. As the membrane of the tympanum lies obliquely this process is consequently placed obliquely; but its lower end, which corresponds to the rod *a f* of the first delineation, bends upwards, so that the foot-plate of the stapes, which is united to it, looks in a certain degree in the same direction. This foot-plate is introduced, like the piston of a syringe, but more loosely, into an oval aperture (*fenestra ovalis*) of the bony wall of the so-called labyrinth; around its edge there extends to the margin of the aperture a small membranous border which renders the aperture water-tight, while, through its elasticity, it permits the stapes to make slight excursions up and down in the receptacle. The opposed opening, (*fenestra rotunda*,) whose necessity was shown above, exists in the labyrinth in the shape of a small round window, closed with an elastic membrane.

It will not be difficult for the reader, with the aid of our previous representation of the general scheme, to conceive in what manner this apparatus, under its actual conditions, must operate when the membrane of the tympanum is made to oscillate by the impression of the air-waves. If the membrane of the tympanum be driven inwards, both malleus and incus move as if they were but one piece, though, at first, it is true, only the handle of the malleus is directly moved; but the incus follows the impulse, the adjustment admitting of no counter action. Both turn upon the common axis, which consists of the long projection of the malleus, and the short process of the incus, so that the neck and head of the malleus, and thus the part of the apparatus lying above the axis, describe an arc

outwards and downwards, the handle of the malleus, on the other hand, and the long process of the incus describe an arc inwards and upwards, and consequently the stapes fixed at the end of this long process is pressed more deeply into the oval window of the labyrinth. If the membrane of the tympanum bends outwards with the receding wave, the preceding movements are reversed, the part of the apparatus above the axis turns inwards and upwards, the part below the axis outwards and downwards, so that the base of the stapes is proportionably withdrawn from the oval opening. These changes of direction, alternating in rapid succession, produce undulations in the fluid of the labyrinth, of which we shall presently have occasion to speak.

We should by no means think of the described movements of this system of ossicles as being of any considerable extent; on the contrary, the displacements undergone by its several parts from the appulse of even the strongest waves upon the tympanum are excessively slight; indeed, we meet with certain arrangements in the apparatus which are evidently calculated to restrict the extent of these movements. This end is subserved, especially, by the ligamentous fastenings of the axis of movement and of the base of the stapes. Were it intended that the malleus and incus should follow, freely and unimpeded, the most extreme flexions, inwards and outwards, which the membrane of the tympanum might execute under the influence of the air-waves, the ends of the axis must have been inserted, like those of an axletree, in sockets which oppose no resistance except that arising from friction. But the ends of the axis in question are tightly secured by tense ligatures, which are twisted by every turn of the axis, and by virtue of their elasticity offer the more resistance the greater the torsion. In like manner a resistance is opposed to the movements of the apparatus by the nature of the ligature which unites the base of the stapes with the fenestral opening; the small membranous border, before described, very quickly arrests by its tension the intromission and retreat of the foot-plate. It is apparent, also, that the resistance thus offered restricts the oscillations of the tympanum itself, causing them to be of less extent than they would be, under an equal force of the air-waves, were the membrane not united with the ossicles. The object of this restriction is easily conjectured. Though we know not what force of the atmospheric undulations can be borne by the extremities of the nerves suspended in the fluid of the labyrinth, yet we may well infer that they would be injuriously affected by a very violent shock, as the nerve of sight is dazzled by too intense an undulation of the luminous ether. As in the eye protective arrangements are met with which in a certain degree shield the optic nerve from too strong an impression of the light, an analogous intention may, with the greatest probability, be ascribed to the adjustments which in the small bones of the tympanum act in restraint of their movements. This probability almost becomes certainty when we take into view a further arrangement of this apparatus, for which scarcely any other object can be imagined than to prevent too violent a percussion of the fluid of the labyrinth. This arrangement we will now examine somewhat more closely.

Wherefore do we find, in place of an inflexible lever, consisting of one piece, such as is supposed in our representation of the general scheme of operations, and as would have fulfilled all the conditions of those operations, an apparatus composed of two separate parts, malleus and incus, connected with one another by a species of hinge. What are the kind of movements for which this hinge is destined, and what is the signification of this mobility? Why, again, is the stapes a separate bone? To be able to answer these questions, we cannot dispense with bringing to the notice of our reader the existence and mechanical relations of two small muscles, evidently destined for the movement of these bones of the ear, one of them pertaining to the malleus, the other to the stapes. The first is the more important; it springs from about the middle of the skull, passes with its soft and somewhat long fasciculus of fibres, in a channel of its own, to the cavity of the tympanum, into which it penetrates, with its tendinous end,

opposite to the tympanic membrane. The tendon goes obliquely through the cavity, and is attached, at a right angle, to the handle of the malleus, near the turning point. We must suppose it to be known what a muscle is, and shall therefore only observe that every muscle has the power of contracting under a certain influence of the nerves, by which means a thickening takes place in the body of the muscle, and its two ends are brought nearer to one another. When the muscle in question, the so-called *tensor tympani*, contracts at the excitation of its nerve, it tends, since its interior point of origin is immovably fixed, to draw its exterior point of insertion, and consequently the handle of the malleus, inwards. But the malleus alone cannot freely follow this traction, first, because it is itself fastened by its long projection to the wall of the cavity of the tympanum; secondly, because it is inserted between the coats of the tympanic membrane; thirdly, because it is connected by articulation with the incus. It is not easy to determine with certainty in what manner this resistance modifies the displacement of the malleus by the muscular traction. Were the malleus and incus united in one piece, the operation of the muscle could be no other than that of a condensed wave of air coming from without; it would turn the lever apparatus in such manner on the above described transverse axis, that the handle of the malleus and the longer process of the incus would move inwards and upwards, and the stapes be thereby pressed deeper into the fenestra ovalis, while the membrane of the tympanum united to the handle must also comply with the traction, be drawn further inwards, and consequently rendered more tense. This is, in fact, the muscular effect which is generally recognized, and has procured for the muscle its name of "*tensor tympani*." There are circumstances, however, which justify hesitation in admitting that in this simple way everything is explained. The muscle is relatively very long and its tendon attached so near the turning-point of the malleus, that if, through the contraction, it were shortened by a very small part of its length, the result would be a comparatively very large introversion of the malleus. Now, the membrane of the tympanum might indeed, under strong tension, follow with the malleus the traction of the muscle to a considerable extent; but not so the incus, because the penetration of the stapes into the *fenestra ovalis* would encounter insuperable resistance, partly in the ligature of the foot-plate by the narrow border, partly in the fluid which can only yield so far as the opposed opening of the labyrinth, the so-called *fenestra rotunda*, permits. Hence a forcible pressure of the stapes would render the propagation of the sound-producing movement wholly impossible, since no condensed wave would be capable of driving it more deeply inwards, no rarefied wave could move it outwards against the traction of the muscle. The length of the fibres of the muscle shows, on the other hand, that the magnitude of the movement for which it is intended can be no such very slight one, for, throughout our body, the length of the muscular fibres is found to be in direct proportion to the extent of the movement to be accomplished by them. The supposition is therefore forced upon us that the muscle in question can move the malleus alone to a certain extent, without any proportionable movement of the incus; that the malleus, while, with the membrane of the tympanum, it obeys the traction of the muscle, is pressed more firmly against the incus and into the joint which connects both. This hypothesis is the more plausible, because by this alone is explained the presence of the articulation, for which there would otherwise be no apparent reason. We must unfortunately renounce the design of laying before the reader proof of the correctness of the hypothesis drawn from the structure of the articulation, the direction of the muscular traction, &c., for the discussion of these extremely subtle relations would be impossible without the employment of preparations from nature, and would perhaps even then leave the matter in doubt. We can therefore only trust to the reader's faith when we allege that the tensor muscle, in contracting, draws the malleus somewhat inward, thereby occasioning greater

tension of the tympanum, but leaves the incus in its natural position, because it turns the malleus less upon the axis common to the two ossicles than upon a vertical axis which passes through the point at which its long projection is attached to the wall of the cavity. Both malleus and incus acquire, through the resulting pressure of their articulating surfaces against each other, a new relative position, but act in this new position, towards the waves of sound arriving from without, as a single lever which propagates their impressions by means of the stapes to the fluid of the labyrinth.

If our readers should perhaps think this explanation of a small and inconspicuous mechanism tiresome and superfluous, while we can take no exception to the first of these epithets, we must protest against the application of the second; the influence of that mechanism on the hearing is, in fact, of the highest importance. In what follows we shall simply regard, as the effect of the muscle in question, an increase of the tension of the membrane of the tympanum, and shall inquire in what consists the utility of that effect. There can be no doubt that it consists in *deadening the effect* of too intense an action of the waves of sound. It is a physical fact that strongly stretched membranes respond to these waves with less intensity, are thrown by them into weaker vibrations, than membranes in a state of less tension; a fact which has been shown by multiplied experiments and may be here taken for granted. As the skin of a drum is pressed inwards by the hand with more difficulty when it is tightly stretched than when relaxed, so the membrane of our ear opposes the greater resistance to the force of the impinging undulations of the air the greater the tension of the membrane. It is a matter of indifference whether the stretching force is exerted around the rim in the plane of the membrane, or, as is the case with the action of the tensor tympani, at the centre of the membrane and perpendicularly to its plane. It has already been seen that the resistance opposed by the membrane to the air-wave increases in proportion to its convex curvature from the increasing force of the elastic reaction; the tensor muscle, which acts like a wave of condensation in producing inward flexion of the membrane and thereby increasing its tension, must in like manner intensify the elastic forces and increase the resistance to the air-waves. Now, if the membrane, in consequence of the increased tension, executes vibrations of less magnitude, in the same degree will the oscillations of the small bones which are moved by it, and finally the intensity of the undulations in the fluid of the labyrinth, be abated; in a word, a given air-wave excites a weaker sensation of sound under strong tension of the tympanum than under slight tension.

This result may at any time be verified in the simplest manner—not, indeed, by a voluntary contraction of the tensor tympani, but by other means which we possess of increasing the tension of the membrane. The cavity of the tympanum is not altogether closed up, for the *Eustachian tube* penetrates into it with a rather long channel, which, at its anterior extremity, opens into the hinder part of the throat near the palate; by this channel the air within the cavity is placed in communication with the outer atmosphere, which, in the act of breathing, passes by the orifice of the tube. By a certain effort, during that act, it is in our power to press the air through this tube into the cavity of the tympanum, and, by another sort of effort, to withdraw it therefrom; the first takes place if, in the act of ordinary expiration, we bar the egress of the air through the mouth and nose, and thus compel its passage into the Eustachian tube; the second, if, with closed mouth and nose, we make an effort at inhalation, and, by thus enlarging the space occupied by air, produce its rarefaction in all parts of the respiratory apparatus, and consequently in the cavity of the tympanum. In both cases the tympanic membrane is more tightly braced; in the former the inhaled air presses the yielding membrane outwards; in the latter the membrane is drawn more strongly inwards in consequence of the rarefaction of the internal air, and the same effect is produced as by a contraction of the tensor muscle. In both cases obtuseness of hearing is the result. If we press air with force

into the cavity, there occurs, at the moment when the air enters, a cracking or clashing noise, which is very clearly perceptible to ourselves, and may even be heard by others, if their ear be brought near to ours; during the whole time that air is thus compressed in the cavity there exists, but perceptible only by ourselves, a humming noise, which increases and decreases with the force of the compression. The nature and causes of this singular noise in one's own ear are not determined with certainty. According to an old and widely-received opinion, the cracking sound arises from a sudden and voluntary contraction of the tensor muscle and the consequent sudden stretching of the membrane of the tympanum; but as the noise does not, as the supporters of this opinion believe, occur at the moment when air ceases to be driven into the cavity, but, on the contrary, at the moment when it commences, this view is clearly erroneous. The noise arises upon the sudden flexure outwards of the membrane, and therefore with the tensor muscle relaxed. A conjecture advanced by the author of these lines is to the effect that the phenomenon in question is perhaps to be explained in a manner analogous to the well known cracking which ensues when a finger is suddenly and forcibly pulled, and proceeds from a sudden separation of the closely contiguous surfaces of the articulation between the malleus and incus; it supposes that the abrupt outward flexure of the membrane may produce an instantaneous and audible severance of these surfaces, of which the first must follow the membrane, while the last cannot, on account of the unyielding ligature of the stapes. This conjecture it would be difficult to verify, wherefore we shall not dwell upon it, but return to the dullness produced in the perceptions of the organ by the contraction of the muscle of the malleus.

The intention of this superinduced dullness of hearing is apparent from what has been said above; it consists in preventing a too strong and dangerous concussion of the tender nerve fibres by unduly intense undulations of the medium of sound. That this end should be attained, it is unconditionally necessary that the tensor muscle should, at the right time—that is, when air-waves of a certain intensity enter the organ—be brought into action, and this really takes place, although the “how” has not been indubitably shown. It is thought by many that the will provides for the seasonable interposition of the muscular contraction; that is to say, that, if a very strong sound reaches the sensorium, the will calls into service the conscious reaction of the suppressive mechanism. This is neither proved nor probable, for the will would be a very precarious sentinel. In sleep, or when the attention is wholly diverted from the perceptions of the organ, the will would not fulfil its duty, and the nerves would be abandoned to the mischievous effects of immoderate sound-waves. The security would be much greater if the operation of the muscle were brought about by a simple but sure mechanism, which should be set a going by the air-waves in a degree corresponding to their intensity. And this is doubtless the case; the excitation of the nerves of movement takes place, in all probability, through a reflex action of the nerves, just as it is by this reflex action that the pupil of the eye is narrowed, and the dazzling effect of too intense light-waves thereby diminished. If a very intense wave of sound reaches the ear, so that the auditory nerves are thrown into strong excitement, these immediately transfer in the brain that excitement to the nerve fibres of the tensor muscle with which they are in direct communication by means of a cellular apparatus; the centrifugal excitement thus propagated, (the nervous current), on arriving at the muscle, determines a contraction of its fibres—a contraction which will be more considerable, the stronger the excitement and more forcible the air-wave. In this way, it is true, the tension of the tympanum, which serves for deadening the sound, comes somewhat *post festum*, since already a part of the wave has been conveyed with undiminished intensity to the fluid of the labyrinth and the nerves of hearing; that part, namely, which calls the reflex action of the nervous excitation into existence. But it suffices probably for the protection of the nerves of hearing, if only a long continuance of the violent concussion is spared them; but, from

the rapidity with which the nervous current is propagated, and the shortness of the route through a nerve of hearing to the brain, and thence again through the nerves of motion to the tensor muscle, that part of the waves of sound which takes undiminished effect will, in most cases, be excessively small in comparison with that whose intensity is broken by the obtunding apparatus. In the eye it is no better. Here also the path of the reflex action, by which the protective apparatus is brought into service, lies through the nerves of the sense itself: the strong excitement of the optic nerve by dazzling rays of light is transferred in the brain to the motive nerves of the so-called iris, and determines this to a contraction of the orifice by which the rays are admitted. So much concerning this corrective apparatus to the ear. Respecting the operation and uses of the small and short muscle called the stapedius, which springs from the wall of the cavity opposite to the stapes and is attached by its tendon to the neck of the latter, there prevails much greater uncertainty; we shall, therefore, spare our readers a discussion of conjectures which are untenable, or, at least, destitute of proof. Possibly this muscle also is destined to the purpose of lessening the effect of intense air-waves.

Before we direct our attention to the labyrinth and the apparatus of the nerves of hearing, we should briefly consider some of the relations borne by the *cavity of the tympanum* and the duct called the *Eustachian tube*, by which it is connected with the cavity of the mouth. Although not the slightest doubt can exist as to the immediate signification of these parts, and there are no grounds for supposing this explanation of their existence inconclusive, yet much ingenuity and fruitless pains have been employed in vindicating for them far other and the most singular purposes. Obviously, the cavity and the tube must exist in the ear as the air-space and air-hole in an ordinary drum. The membrane of the tympanum could not vibrate were it not surrounded on both sides by air; the small bones of the ear would be immovable if, instead of being in air, they were fixed in some mass of solids. The air in the cavity, since it would be compressed by the inward curvatures of the membrane, would oppose resistance to the movements of the latter if it did not find in the tube a ready issue when the membrane is driven inwards, and ready entrance when the membrane again swings outwards. This is so simple and clear that all further explanation would seem unnecessary. We shall, however, briefly notice some of the hypotheses advanced on this subject, and hope to show, even to the uninitiated reader, how untenable they are. It has been surmised, for instance, that the waves of sound which the vibrating membrane of the tympanum must communicate as well to the air contained in the cavity as to the ossicles cannot properly be supposed to be lost, but must also be available for the use of the organ of hearing, just as if it were a criminal prodigality of nature if every one of these waves which impart their effect with such constant and beneficent impartiality to all that can vibrate did not reach the auditory nerves of man or beast. The ossicles of the tympanum are so apposite, certain, and sensitive an apparatus for the propagation of these sound-producing undulations, that there needs no second route for conducting them to the nerve; but were such an one really necessary, nature could have chosen none more unsuitable than that through the air of the tympanic cavity and the Eustachian tube. For these self-propagating waves of the air contained in the cavity, there is but one conceivable manner in which they could reach the nerves; no one would think of asserting that they could be transmitted to the osseous wall of the labyrinth, from this to the enclosed fluid, and from this to the nerves; but the membrane which has been mentioned above as closing the *fenestra rotunda*, the opposed opening of the labyrinth, and which is pressed on one side by the air of the cavity, on the other by the fluid of the labyrinth, has been seized on as furnishing the requisite mechanism. It has been contended that the air-waves of the cavity must throw this membrane into vibration, just as the waves in the external meatus of the ear do the tympanic membrane, and that the vibrations of the former in the fluid of the labyrinth

would be as capable of creating waves for the excitation of the nerves as the movements of the stapes in the *fenestra ovalis*. In itself this last position is not to be controverted; but it is to be inquired, first, whether the membrane is really thrown into sensible vibration; and secondly, whether its oscillations can take effect upon the nerves simultaneously with those propagated through the ossicles of the tympanum. We do not hesitate to answer both questions in the negative. To be thrown into vibration by air-waves, a membrane must receive their impact, as far as possible, in a perpendicular direction. But this membrane of the *fenestra rotunda* lies as unfavorably as possible in regard to waves proceeding from the tympanum, inasmuch as it is turned away from the tympanum and towards the Eustachian tube, so that the waves can as little strike it directly as, in the dark, one could strike a disk whose edge instead of its flat surface was presented.

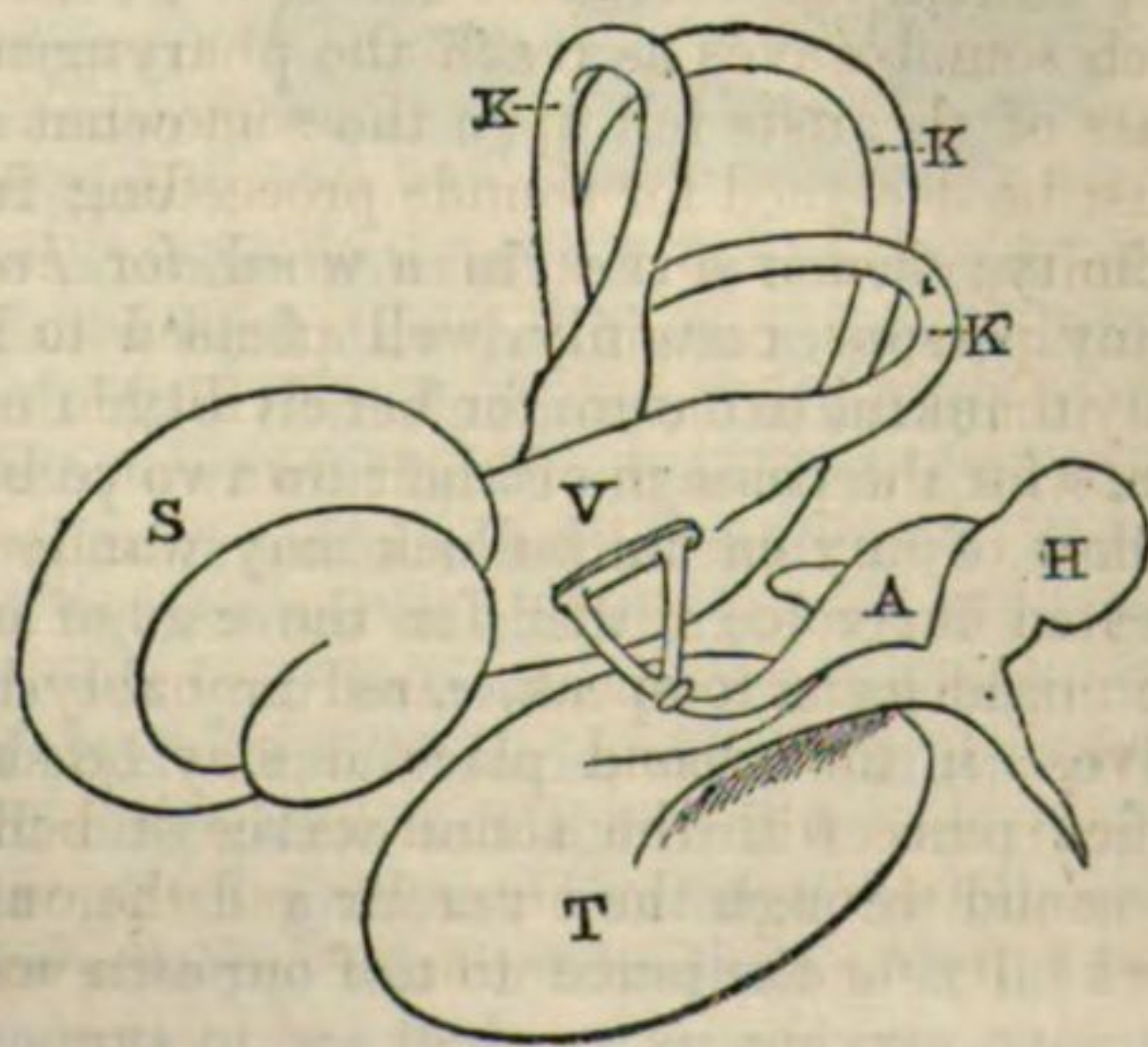
Now, that it is not inaccessible to the waves is certainly true, since its surface fronts directly on the air chamber; but its position would much sooner suggest the idea that it is, as far as possible, sheltered from the effect of these waves than that it is designed for their reception and transmission. But even if we admit that it is, in a slight degree, movable by the waves of the tympanic cavity, it is not difficult to show that these movements must be overborne and annulled by the opposed movements simultaneously imparted to it by the fluid waves proceeding from the stapes. When an external wave of condensation drives the membrane of the tympanum inwards, the stapes is driven deeper into the *fenestra ovalis* and the fluid of the labyrinth is propelled before it; but this propulsion is only possible, as has been shown, through the simultaneous outward curvature of the opposite membrane, that, namely, of the *fenestra rotunda*. Now, the same inward movement of the tympanum generates simultaneously a condensed wave in the air of the tympanic cavity, and if this wave strikes the membrane of the *fenestra rotunda* it cannot do otherwise than drive this membrane inwards, and therefore in a direction opposite to the former. But as the waves of the fluid in the labyrinth will, no doubt, act with more force on the membrane than the air-waves of the cavity, the former must prevail and the membrane curve outwards in spite of the latter force. Were the preponderance reversed, it is manifest that any movement of the fluid by the stapes would be impossible, and the whole system of ossicles would be brought to a stand. Hence the sheltered and most unfavorable position of our membrane as regards the reception of the air-waves would seem to have been wisely ordered, and to be an indispensable condition for the propagation of the sound through the small bones of the ear to the labyrinth.

Other hypotheses respecting the intent of the cavity of the tympanum and the Eustachian tube seem to have as little foundation as the above. It has been thought by some that the tube was established for the purpose of conveying waves of sound from the throat to the organ of hearing. When convinced that this notion was untenable and that the tube could be of no avail in conducting such sound-waves as reach the pharyngeal cavity from the outer air, the same class of theorists fell upon the somewhat *naïve* idea that the tube in question must be designed for sounds proceeding from the organs of speech in its close vicinity; that it serves, in a word, for *hearing our own voice*. Now there are many persons, certainly, well pleased to hear themselves speak, who would be duly thankful to nature for her civility in establishing quite a special and private route for the passage of their own voice besides the common one into which the bellow of any casual bullock may wander. But, in the first place, nature has created our voice rather for the ears of others than our own, and, except that we might learn to speak, cared probably little about its being audible to ourselves; in the second place, it may be shown that, setting aside any possible concurrence with the sound-waves of bellowing bullocks, the common channel of sound through the outer air and the outer ear to the tympanum not only suffices fully for the perception of our own voice, but, under ordinary circumstances, is the only channel for its admission. The Eustachian tube is not by any

means always thoroughly open, but usually its walls lie close to one another, although so loosely that every inward curvature of the tympanum readily separates them for the expulsion of a portion of the air within the cavity. It opens not so readily to the air of the pharynx; a peculiar effort is necessary to effect an entrance of the air in the above mentioned experiment. In ordinary speaking and singing this effort is never used; the air coming from the lungs chooses the broad and unobstructed outlet of the mouth or nostril, and passes by the orifice of both ear-tubes without opening them; consequently, no sound-producing air-waves come ordinarily by this channel to the organs of hearing. That happens only when, in speaking or singing, we make a peculiar effort, and then indeed we suddenly hear our voice, which before sounded as coming from without, with deafening force and as if it originated in the ear itself. This last circumstance is of particular significance; we shall see further on that, in idea, we then only judge the source, which we regard as cause of a sound, to be *without* us, when the waves thereby generated reach our organ of hearing through the external meatus of the ear; but whenever it happens that this is impervious to the air-waves, we seek the source of the sound *within* ourselves, even when it is really without. There can, therefore, be no question of hearing our own voice through the Eustachian tube, not to say of its destination for this purpose. We could submit more of such hypotheses to criticism were it worth while. Much has been idly said respecting a strengthening of the waves of sound in the cavity of the tympanum through *resonance*, but a closer examination of these suppositions would require a special investigation of the physical nature of resonance, its conditions and laws, which would lead us too far, and, candidly to speak, be difficult of explanation to novices in this kind of knowledge.

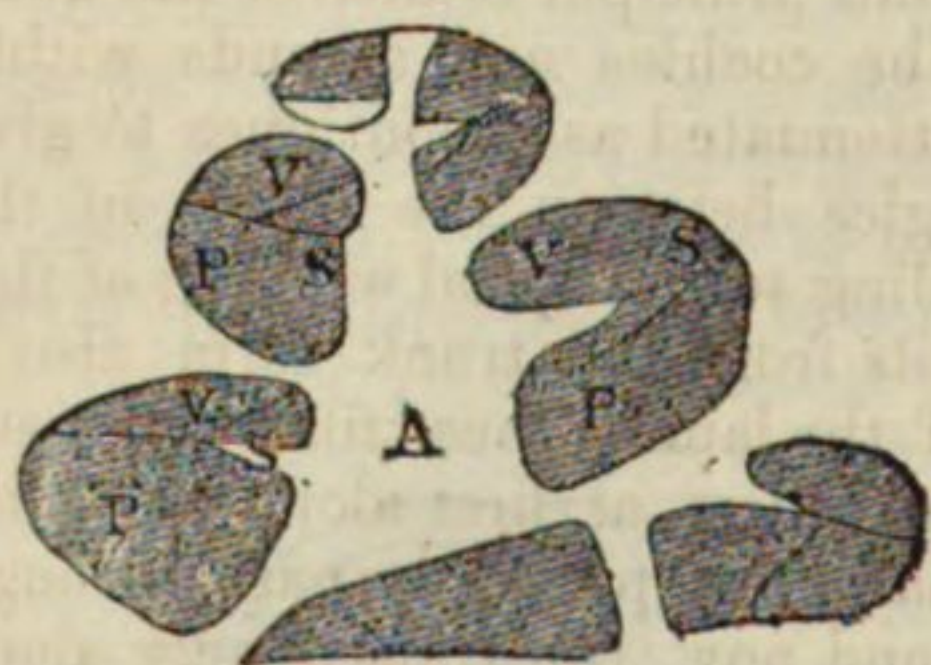
We leave now the outworks of the organ of hearing and enter upon the proper citadel, the recess in which the ramifications of the auditory nerve are distributed for the reception of the waves of sound, for whose conveyance the apparatus we have been considering is destined. This recess, to which the name of *labyrinth* has been given, is, as that name implies, a wonderfully complicated structure, in which, though we need no thread of Ariadne to lead us aright, we everywhere encounter mysterious arrangements, whose full acoustical and physiological understanding is reserved for future times. The labyrinth is a cavity surrounded with walls of bone and filled with a fluid, having two openings, of which one (the *fenestra ovalis*) is closed by the stapes and its annular ligament, the other (the *fenestra rotunda*) by a membrane; this cavity has not, however, the simple shape of a sack, but consists of many compartments and canals in a winding form. If the collective labyrinth be carved from the so-called petrous bone, out of the substance of which it is channelled, it presents, when seen from without, the appearance of the accompanying figure. It consists of two chief divisions, the *vestibule* V with the *semicircular canals* K, and the *cochlea* S. We will consider first the vestibule and the canals. The proper vestibule, which forms the middle part of the whole labyrinth, is ovoidal in shape, and measures about one-fifth of an inch from before backwards and a little less from above downwards; its wall exhibits eight openings. One of these is the already mentioned *fenestra ovalis*, which leads into the cavity of the tympanum and receives the foot-plate of the stapes; a second leads immediately into the spiral canal of the cochlea; a third passes to a narrow channel bearing the

Fig. 9.



name of *aqueductus vestibuli*; the remaining five openings lead into the three semicircular canals, while each of these canals has its opening orifice in the vestibule and runs back with a terminal orifice into the same; but as one of these apertures is common to two of the canals, there are, in effect, only five of them instead of six. The vestibule itself shelters in its water-filled cavity two little membranaceous sacs, also filled with fluid and imbedded in separate depressions (*foveæ*) of its wall, being channels for the nerves, of which we shall hereafter speak. The semicircular canals are narrow bony tubes, bent somewhat into the shape of a horseshoe, enlarged at their commencement and termination, and from their position and direction are distinguished as the superior, posterior and horizontal canal. As nothing results from their special position, we will not detain the reader with the pedantry of a scrupulous anatomical description of them; the above outline conveys an adequate idea of their form and direction. In each of these canals is fixed a membranous tube, which has the same form as the canal, as if it were a reduced cast of it, and dilating therefore at the beginning and end of the canal into a small roundish cavity called the *ampulla*. The interspace between the membranous tube and the osseous wall of the canal, as well as the tube itself, is filled with a watery secretion, which is in immediate communication with that of the vestibule. The sack-shaped origin of each membranous tube is a conduit for the nerves. The cochlea well deserves its name; the best idea of its form may be acquired by observing the shell of the common garden snail. As in this shell a spiral and constantly diminishing channel winds, from the base to the apex, around a central spindle, so the interior chamber of the cochlea consists of a similar screw-shaped canal, which describes, with a like progressive diminution, two and a half turns around the *modiolus* or central axis, terminating, not in a point, but in a funnel-shaped dilatation. A more striking difference between the shell of a snail and the cochlea consists in this: that the canal of the latter is not single, but is divided, throughout its length, by a transverse partition into two passages, one of which runs above, the other below the dividing wall, but which communicate with one another in the funnel-shaped expansion; resembling in some sort a winding staircase by which one might ascend to the top, and, stepping over again, arrive at the bottom. An idea of this arrangement may be conveyed by the annexed figure,

Fig. 10.



which represents a central longitudinal section of the cochlea from its base to its apex. A denotes the central axis, S the partition wall running around it, V and P the winding passages separated from one another by this wall. These passages bear the name of *scalæ* (stairs); that above the partition, marked V, being called the *scala vestibuli*, that below, marked P, the *scala tympani*. They owe these names respectively to the circumstance that the former communicates, by an oval aperture, with the vestibule, while the latter is closed below by

the membrane of the *fenestra rotunda*, which faces the cavity of the tympanum. Both passages are filled with fluid which, at the entrance of the *scala vestibuli*, is in immediate communication with the fluid of the vestibule. The partition S, which divides the canal into two passages, is constituted, as the figure represents, by a thin lamina winding spirally around the axis, to which it is attached by its inner edge, while its outer edge adheres to the outer wall of the cochlea. It consists of two *zones*, as they are called, united with one another, the one osseous, the other membranous, which together extend quite across the canal; that part of it which lies contiguous to the axis being composed of two thin lamellæ of bone and reaching as far as the middle, while the outer part, by which it is continued to the opposite wall, consists of a soft membranous substance, serving, as we shall see, to support the tender apparatus of the nerves.

The description in its several parts of the auditory nerve, which distributes filaments in the cavity of the labyrinth for the reception of the advancing waves of sound, is rather a precarious task, which we may facilitate however, without any real loss to the reader, by forbearing to enter into those subtle details which, if a novice, he would scarcely understand. Nor will this be wholly a sin of omission, for, truth to say, the wonderful apparatus here displayed to us by the microscope is, in its physiological signification, not much less than altogether unknown to the physiologists themselves. It is only to-day, so to speak, that the coryphæus of our science has succeeded in detecting the true anatomical constitution of the extremities of the nerves of hearing in the cochlea and vestibule, so difficult is it to submit uninjured to observation these infinitely delicate structures, hidden deeply in the skull and shut up within osseous walls, and to grope one's way in the astonishing complexity of the elementary tissues which the microscope reveals in them. The auditory nerve, running back from its origin at the base of the brain, issues, after a short course through several openings in the petrous bone, into the labyrinth, and here divides into two principal branches destined for different parts. Each penetrates by a separate aperture, the one into the vestibule, the other into the cochlea. The former again divides into numerous filaments which direct their course partly to the two membranous sacs of the vestibule, partly to the membranous *ampulla* situated at the beginning of the semicircular canals, where their extremities are distributed something after the manner of a delicate brush. These minute fibres, each of which forms an isolated conductor of the nervous current, terminate finally in delicate bulbs or nerve cells. It is a remarkable peculiarity that at the terminal expansion of the nerves of hearing a finely grained calcareous substance is interspersed through the delicate fibrous tissue of the vestibular sacs, consisting, as is clearly apparent under the microscope, of minute but distinctly formed crystals. Chemical investigation has shown that this *otolith* or "sand of the ear," consists of a compound widely dispersed through animate and inanimate nature, the same which, under the name of chalk or marble, forms mountains and rocks, and which, as shell, protects from outward injury the embryo of the feathered tribe; in a word, of *carbonate of lime*. It may be mentioned by the way that this calcareous matter is not peculiar to man, but occurs also in the organ of most animals, partly as a finely crystallized mass, partly in larger or smaller crystals; its significance as respects the hearing has as yet resisted all efforts of conjecture and experiment. The second principal branch of the auditory nerve, the cochlear, passes to the base of the cochlea and ascends within its axis to the apex, becoming more and more attenuated as it continues to give out filaments which proceed from it at right angles between the plates of the bony lamina, to their outer border. Corresponding to the spiral winding of this septum or partition wall, the filamentary offshoots from the trunk form also a spiral line. At the edge of the bony portion of the lamina these filaments issue upon the membranous portion and pursue their course at first along its under surface and consequently within the scala tympani, but presently pass through different small foramina into the scala vestibuli and now run transversely along the upper surface of the membranous lamina towards the outer wall of the cochlea, in the neighborhood of which they terminate. That part of these filaments which traverses the upper surface of the membranous lamina in the scala vestibuli, is, however, no longer the simple nerve fibre which we observed in the trunk and in its course between the plates of the bony portion of the lamina; it has become a singularly complex structure with cells, partly inserted in its progress, partly as appendages of the stem. It would require no little detail to give an exact account of the microscopic constitution of these nerve extremities, nor would our inquiry even then be much advanced, since physiology is still greatly in the dark as regards this delicate mechanism. The reader will perhaps obtain the best idea thereof if he imagines himself ascending, suppose in the scala vesti-

buli, by a real winding staircase, the stairs of which consist of many thousand small and closely contiguous steps, each step being represented by the transversely directed terminal part of one of these nerve filaments. It is still in dispute whether this terminal apparatus floats freely in the fluid of the scala vestibuli, or adheres by its outer end to the membranous lamina; whether it is covered over by a second delicate membrane and thus is enclosed between two membranes, &c.

We proceed now to a consideration of the transmission of sound in the labyrinth. We have seen that the waves of sound are communicated to the fluid of the labyrinth by the piston-like movements of the stapes in the fenestra ovalis, and have been led to recognize the corresponding out and inward curvatures of the membrane of the fenestra rotunda as the indispensable condition through which the undulatory movement of the fluid is rendered possible. But how these waves are constituted, how propagated, what their special destinations in the different divisions of the labyrinth, in what manner they operate on the extremities of the nerves in the vestibule and the cochlea, for what reason these extremities present to them so peculiar an apparatus and arrangement, these are questions which press for an answer, and until answered debar us from a solution of the mystery in which the excitation of the nerves by the waves of sound is enveloped; the answers given to them have thus far, however, proved poor and unsatisfactory. The nature of the fluid-waves of the labyrinth is essentially the same with that of the air-waves; according as the stapes presses inwards or is withdrawn, there is a succession of waves of condensation and rarefaction, in which the single particles of the fluid, as they follow one another, act precisely as was above explained in reference to the particles of air. The course of the waves is, at least in its principal features, clearly and definitely prescribed; the waves must first be propagated into the vestibule, whereby the membranous sacs suspended therein, together with the extremities of their nerves, will be agitated. Were the vestibule entirely shut in, while only the fenestra rotunda, closed with its membrane, found a place at a point of the osseous wall, the waves would be restricted in their play, and would everywhere bound against the solid structure and be beaten back from it like the sea from a rocky coast. The repulsed waves would encounter those which were following, and disturb their action by giving to their advancing particles a contrary impulse. As, in this way, the whole effect of the waves in producing a regular excitation of the nerves would be frustrated, it is evidently of the utmost importance that the vestibule should be provided with the numerous openings which lead to the canals filled with fluid; these canals serve as conduits for the waves of the vestibule, which must necessarily traverse them as well as the long passages of the cochlea before reaching the fenestra rotunda, which lies at their further extremity, and which, by the yielding of its elastic membrane, alone renders the existence of the waves possible. The action and course of the wave in the semicircular canals are difficult to ascertain with physical accuracy; but, as regards the cochlea, it is at least clear that, since only the upper scala opens into the vestibule from which it takes its name, the wave must traverse the whole canal by this passage to the apex, then pass over into the scala tympani and descend by the latter, which lies underneath the dividing lamina, until it finally takes effect on the membrane of the fenestra rotunda at the base. During its course through the scala vestibuli it must strike in regular succession upon all the nerve extremities which cross that passage, and exert upon each of them, one after the other, its peculiar excitation. This is but a rough sketch, it is true, of the movement of the waves of the labyrinth, but it is nearly all that we know with certainty. Efforts have not been wanting to penetrate further, and especially to ascertain whether, where, and in what direction the waves are reflected or thrown back, whether this reflection produces an increased degree of undulating intensity through resonance (somewhat in the manner of the reflection of the

waves of sound from the walls of a lofty apartment.) Numerous investigations have been instituted by the most ingenious experimentalists to throw light upon these subtle inquiries, but the results have been so scanty and uncertain that we abstain from the discussion of the different conjectures advanced, especially as the possibility of making them sufficiently intelligible must be doubted. It has also been a question, and one which has long been the subject of lively scientific discussion, to what end serve the different arrangements observed in the extension of the terminal portions of the nerves, first in the saccules of the vestibule and semicircular canals, in which the brush-shaped ramifications of the nerve extremities are struck simultaneously by advancing particles of the fluid; secondly, in the cochlea, in which these nerve extremities are so arranged behind one another that the waves must strike them successively one after the other; or, more generally, what special design have the cochlea, the vestibule, the semicircular canals? We might fill pages with the enumeration and criticism of the conjectures in which a solution has been sought, and would only see that most of them were destitute of proof, some even absurd. It has been supposed, for example, that the semicircular canals serve for a knowledge of the direction from which the waves of sound proceed. As if the perception of the direction could at all be the object of an impression of the sense; as if a wave of the fluid could telegraph to the mind, through the nerve which is struck, the point of the compass from which the excitation is directed; as if a different direction of the fluid-waves within the labyrinth could be the herald of a different direction of the air-waves without! We hope to explain presently in what manner we obtain an idea of the position in space of the external sources of sound. In regard to the cochlea, the opinion has long obtained favor that it is intended to conduct to the nerves contained in it the waves of sound directly communicated from the air to the bones of the head and propagated through these, while the vestibule is destined only for the reception of the vibrations transmitted through the auditory canal, the tympanum, and the ossicles. This assumption rests on the early but erroneous opinion that the nerve filaments of the cochlea terminated between the bony plates of the laminar partition. Since it is known, however, that they issue from these and terminate free in the fluid of the cochlear canal, this hypothesis has become untenable, for air-waves (and it is these almost alone which convey a sound to the human ear) are transmitted with so much difficulty and so much enfeebled to the bones of the cranium, and again with such difficulty and feebleness from these to a fluid (the cochlea fluid,) that it is scarcely conceivable that in this way a sound producing vibration could reach the nerves of the cochlea with a strength sufficient for their excitation. In short, the unpalatable but honest confession of ignorance is the only answer which can properly be given to the above questions.

We have finished our explanation of the progress of the auditory excitation in our organ of hearing; we have followed the sound-producing movement from its origin in the outward object (the vibrating string) through the external air, the external ear, the auditory canal, the tympanum, the movable bones, and the fluid of the labyrinth, to the nerves. We come now to the pith of the subject, the problem which it is the part of acoustical physiology to solve, to the question, how does this movement operate upon the nerves when it has reached them? How does it release in them the so-called "nerve current," which, proceeding through their fibres to the brain, there, by a certain apparatus, so works upon the soul that the latter instantaneously conceives a sensation of sound? We need not combat anew the irrational idea that the sound-movement, as such, is propagated in the nerves; that a sound wave, transmitted from particle to particle, operates as such upon the perceptive apparatus in the brain. We have in earlier articles sufficiently established the fact that the process itself in the nerve fibres is totally different from the external irritant of the sense which produces it; that it is a specific movement of the nerve molecules of a yet unex-

plained nature, and probably essentially the same in all nerves, whether it be generated by waves of light or of sound, by pressure or heat, by objects of taste or of smell. At the peripheral end of all the nerves of sense which we have heretofore considered, we have everywhere found or must suppose an appropriate terminal apparatus, whose function it is so to elaborate the excitation which is received from without, that a movement of the current in the fibres of the nerve shall ensue. This is the case with the nerves of hearing. It is nearly certain that it is not the simple mechanical agitation of the filaments of the auditory nerve which excites them, for this agitation excites no other nerve, yet is the nerve of hearing as like to all others as one copper wire to another; the wave of sound must first call into existence some other action which is capable of stimulating the nerve fibre. Of what nature it is, and how the waves of the fluid of the labyrinth produce it, is wholly unexplained; we can only designate with certainty the seat and instruments of this enabling action; there are here as elsewhere, at the outer ends of the nerves, the minute fibres and bulbs which the microscope discloses to us. Still less have we any intimation how the "current" of the auditory nerves, generated mediately by the undulatory movement, acts upon the brain and the soul, so that the latter forms the specific conception of sound. We can here only refer to the general reasoning by which, in previous essays, it has been shown that it is the quality of the *inner* central and terminal apparatus of the nerve fibres which determines the characteristic effect of the current, the nature of the sensation. Who knows whether, with the sounding plummet of experiment, we shall ever succeed in exploring these deepest mysteries of existence?

The final result of every excitation of the auditory nerve produced by a movement of the kind we have been describing is a spiritual incident, which, in general terms, we denominate a sensation of sound, but of which we distinguish several qualities. We contrast a sensation of tone with mere noise; we divide sounds according to their "*pitch*" and their tone; each of these qualities again is susceptible of an endless gradation of *intensity* from the lightest, only to be perceived by the most strained attention, to that which seems to penetrate us by its intolerable force. The qualities, like the intensity of the sensation, are determined by certain *momenta* referable to the nature of the external excitation; thus the pitch of the sound depends on the number of the waves which in a given time reach the ear; the tone on the form of the waves; the intensity on the magnitude of the displacement which the wave communicates to the particles. The explication of these relations is thus far exclusively the affair of physics; we shall not here enter at large into this branch of learning, because it is at present really not susceptible of a physiological interpretation; that is to say, although we know from experience that a determinate, subjectively recognized sound is causatively conditioned on certain properties of the external movement which are very imperfectly understood, we are unable to explain the *why*; to specify how this or that form of movement acts upon the ear; how it operates upon the nerve; much less can we describe the specific quality of the nervous current, which is its result, or, in the last place, the quality of the sensation. Referring the reader, therefore, to the popular expositions of writers on physics, we shall confine ourselves here to a few observations. A sound of some definite pitch arises when a sound-producing body—a string, for instance—executes a certain number of vibrations in a unit of time, so long as this number is not too small or too great. In other words, the vibrations are only audible, only capable of producing the appropriate excitation of the nerves, within certain limits of frequency. Under favorable circumstances we can hear a sound—the deepest that is possible—when a string, an air-column, &c., executes sixteen vibrations in a second, while with yet slower vibrations the auditory nerve, under all circumstances, remains at rest, be the intensity as considerable as it may. On the other hand, there is also a maximum velocity

with which alone the sensation of sound—the highest possible—consists; this upper limit of the scale of sounds is not accurately ascertained, because with different organs of hearing it is now higher, now lower. It is held, however, that a sensation of sound no longer arises when the number of vibrations exceeds 64,000 in a second. This fact is well suited to show that sound exists not without, originates not in, the vibrating string, but in our own sensation; else were it difficult to see why, with a certain lowest and highest number of vibrations, the laws of movement remaining wholly unchanged, this movement should lose the property of sound. Very conceivable is it, on the other hand, that the auditory nerve ceases to react when the vibrations which strike it follow one another too slowly or too rapidly. An exact physiological explanation of this restriction of the irritability of the auditory nerve to certain limits it is not in our power to give; but it is interesting to observe that there is yet another nerve of sense which affords a complete analogy to this state of relations—the nerve, namely, of vision. As the nerve of hearing is excited by the waves of sound, propagated to it from solid and fluid matter, so is the optic nerve excited by the waves of the luminous ether, which are subject to the same general laws of undulatory movement. As waves of sound of different frequency produce an impression of different qualities of the sensation of sound or a different pitch of tone, so waves of light of different frequency give rise to perceptions of different color, but, as in the case of the auditory nerve, only within certain limits of rapidity. If more than 697,000,000,000 or less than 439 000.000,000 of vibrations of the luminous ether follow one another in a second, the optic nerve is insensible of any impression, even when the vibrations undoubtedly reach it. Between the limits above assigned for the sense of hearing lies an endless series of differently qualified sensations, every possible number of vibrations between 16,000 and 64,000 producing a modification of quality—a *sound* of definite pitch. Yet we mean not thereby to say that our faculty of discrimination among these different qualities is itself unlimited, or, in other words, that we are conscious of a difference of quality in the sensation when two undulations of different rapidity strike the ear near or after one another, how small soever the difference may be. On the contrary, it is a fact easily substantiated that most men have originally but “a poor ear,” but that, through use, a tolerably high degree of delicacy of hearing is attainable; thus, while many scarcely recognize two sounds as of different pitch, one of which is produced by 800, the other by 810 vibrations in a second, there are musicians who seize the difference with accuracy, and distinguish the higher from the deeper tone when the number of vibrations is 1,200 in the one, 1,201 in the other. The auditory nerve, or, more properly, the organ of sensation on which it operates, is in this respect subject to the same conditions with the rest of the organs of sense, being susceptible, through judicious and attentive use, of improvement in its performance, and specially in its faculty of discriminating between sensations of different quality.

A highly interesting question, but one which unfortunately has set at naught every attempt at explanation, arises out of the fact that we can perceive simultaneously a great number of sounds together, and distinguish the pitch, tone, and strength of each of them. The harmonious association of different sounds may often seem to the uninitiated a chaos, from which he is unable to distinguish the individual members, while to the musically cultivated it is no difficult matter to disentangle from the fullest instrumental or vocal orchestra each sound signalized by a special pitch or tone, to follow the melody through all its inflections, and clearly perceive all the transitions; but even the laity know from experience that it is possible to single out an individual voice from the buzz of a company all speaking together. The art consists only in fixing the attention inflexibly on the tone or modulation which we desire to separate from the rest, and in this respect also use refines and strengthens the discriminative faculty of

the sense. At first glance, perhaps, this fact may not seem very singular; not more so than the simultaneous perceptions of other organs—the skin and the eye. Innumerable impressions on the skin are simultaneously perceived, and, in idea, locally separated from one another, if the space between the impressions is sufficient; and when they are situated close to one another the mind takes cognizance of their number, and from that and their position determines the size and form of an external object. So is it likewise with the eye, which can perceive simultaneously so many objects, and direct the attention at will to each of them as sensible and contiguous points on the retina. The analogy of this power of local discrimination in the impressions of touch and sight with the simultaneous hearing of several tones cannot be doubted, but, while for the first the explanation is simple and obvious, an analogous interpretation is not applicable to the sense of hearing. In the organs of touch and sight the severance of the simultaneous impressions rests on the local severance of their external exciting causes; that is to say, on the excitation, through separate impressions, of different conducting nerve fibres isolated from one another—a point which we had occasion to discuss when treating of the sense of touch. Could it be shown that in the ear likewise the undulations pertaining to different sounds acted upon different nerve fibres, a severance of impressions, in conformity with the number of single fibres excited, would be a necessary postulate. But no proof of this is possible; on the contrary, a consideration of the circumstances under which sound is transmitted in the organ of hearing forces us to the conclusion that each wave strikes upon all the nerve fibres, and that a number of undulations, originating near one another, must blend in a single movement long before they reach the reservoirs of the nerves. It is clear that the tympanum cannot possibly vibrate at the same time in conformity with the impulse of several undulations, slowly with the deep, rapidly with the high pitch, with this and that acceleration, according to the character of the tone, in such wise that the simultaneous sounds shall be transmitted, without reciprocal disturbance, from the tympanum, through the intermediate organs, to the labyrinth. Just as a body on which a blow from different directions simultaneously takes effect, cannot proceed in the direction of both at once, but will take a middle course, so must the vibrations of the tympanum take, according to the laws of mechanics, a middle form, resulting from the different concomitant impulsions; and hence only a single undulation, as representative and result of all those generated outside, will be transmitted to the labyrinth. Of any contrivance in the labyrinth by which this compound movement may be again resolved into its original single elements, and each element—that is to say, each undulation belonging to a determinate note or tone—be directed to a special organ, and thus transmitted to the brain, we know nothing and can form no conception. In advance, therefore, it only remains to suppose that this resultant undulation, as such, strikes on its passage and excites each successive nerve, and that it is the soul which first resolves into its constituent elements the compound sensation arising from without; but *how*, is an inexplicable riddle.

We leave the consideration of the pure sensations of hearing, and turn lastly to a brief discussion of the ideas derived from this sense and their mode of origination. As with all the rest of the senses, the sensations first acquire value and serviceableness for the intercourse of the soul with the outer world by their association with certain ideas, which, in the previously educated sense, are so unconsciously and infallibly identified with the sensations, that we take them for the sensations themselves. The sensation of hearing, like every other sensation of sense, is a purely subjective process, a transformation, it might be said, of our consciousness. The cognizance of the existence of an external source of sound as cause of the sensation, the perception of its direction and distance in outer space, pertain to the idea which attaches itself, through a physical operation, so closely to the sensation, and becomes so blended with it, that we seek not only

the source of sound outside of our own ear, but the sound—that is, the sensation itself, with all its qualities; that we think the sound penetrates as such from without through the portals of hearing to our soul. The newly-born child hears like the grown man, has the same quality of sensation, but he knows not whence the sound comes, knows not that it comes from without, or, indeed, that there is anything without him. It learns gradually to distinguish outer objects from its *I*, its *Ego*, and thus comes gradually to recognize the cause of the sensation of sound as something existing outside of itself. We have, as a general thesis, discussed in previous essays on the senses the process by which this objectivity is made familiar to the human mind; we shall here, therefore, only consider the method in which the process is specially conducted as regards the sense of hearing. A fact which at once guides us to a right point of view is this: that only under a certain condition do we conceive an outward object to be the cause of the sensation of sound, and when this condition is wanting, seek the source of the sensation within ourselves, even when we know and are directly informed by other senses that it lies without us; that condition is, that the sound shall be conducted to the auditory nerve through the channel which we have been above anatomizing, the outward ear, the tympanum, and the ossicles. If by any means whatever the transmission of the air-waves to the tympanum and the vibration of the latter be prevented, every sound which, being conducted by the ossicles, reaches the auditory nerve with sufficient force, seems to us to originate within ourselves. This is most readily and strikingly shown by immersion in water. According to the researches of one of our most ingenious physiologists, the tympanum under water only so long conveys the waves of sound, or propagates their oscillations to the labyrinth, as the external passage of the ear is filled with air; if it be filled with water, so that the outer surface of the tympanum is bathed by it, the transmission of waves of sound takes place only through the ossicles or movable bones; but with considerable intensity, since the bones, though as solid bodies they take up with difficulty sound-producing undulations of the air, take up with facility sound-producing undulations of the water. If now, while one is immersed, a sound under water be caused by another person, as, for instance, by striking two stones together, this sound, so long as the auditory canal contains air, will be ascribed to an external source, and its direction be correctly determined; but so soon as the passages of the external ear are filled with water, the sound, from whatever direction it may proceed, will seem to originate within the head. The experiment may be variously modified; and since in the form just described it is somewhat inconvenient, the following method may be resorted to: let the inquirer modulate his voice to a tune, and while continuing to do so, suddenly close both ears firmly with his hands; immediately an entirely different sensation will ensue, the tone of his own voice, which, with the ears open sounded as if from without, will on the instant of the closure seem to arise from within. Since it cannot, then, be doubted that the vibrations of the tympanum in some manner determine the objectivity of our impressions of hearing, it is worth inquiring what part that instrumentality plays. The most probable conjecture is the following: the tympanum is very richly provided with nerves of feeling, which, like the nerves of touch of the rest of the surface of the body, are adapted to sensations of touch and of common feeling; these nerves are thrown into excitation when the tympanum vibrates, and generate a sensation of touch, of the quality of which we are not specially conscious, because it is, as it were, dulled by the sensation of hearing which constantly accompanies it, but which, like every impression on the skin, is associated with the idea of an external object as the exciting cause. As we refer this idea obtained through the nerves of touch to the simultaneous auditory sensation, and, indeed, falsely identify it therewith, we arrive at a perception of the objectivity of the source of sound, without being aware of the circuitous manner in which we acquire it. Here is again an example how one sense comes to the aid of another, how two perceptions of sense

interlink with one another, in order to make one or the other intelligible; this important help does the sense of touch, in community with the "muscular sense," afford to the sense of hearing, inasmuch as they inform us of the direction in which lies the external source of sound. In the first place, the sensibility of the tympanum, just alluded to, furnishes us the ready means of deciding on which side of us the source of sound is situated, since we naturally seek it on the side of that ear whose tympanum, being more strongly agitated by the wave of sound, communicates to us a more intense sensation of touch. The muscles which move our head convey to us, through the sensations continually connected with their action, accurate ideas of the position of that part of our frame, and consequently of both our organs of hearing, so that we are conscious of the position in space of the more strongly vibrating tympanum. If the difference of these sensations of the tympanum is not sufficiently distinguishable to afford a certain judgment, we turn the head on the cervical axis hither and thither until the sensations of touch and hearing acquire greatest intensity in one of the ears, and then present this ear, whose position the muscular feeling teaches us, in a right line to the source of sound, for we know by experience that in this way a given sound is most distinctly heard. If the sensations be equally strong in both ears, we have no alternative but to seek the intoning body directly before or behind us. Most probably, in discerning whether it is before or behind, above or below us, we are guided by another class of sensations of touch, that, namely, which results from the action of the air-waves on the cartilaginous outer ear or auricle. There are simple experiments which show that this member materially assists in the discernment of the direction from which sounds proceed. If we press both auricles closely to the head, we lose the power of discerning with certainty whether the source is before or behind, deceive ourselves easily, and, if the object is before, seek it behind us. If we firmly compress the auricles, and, moreover, place our hands flat in front of both organs so that they shall stand like the auricles, only on the wrong side, we regularly confound before and behind, on an impartial examination of the impressions received. But for those who would repeat these experiments we must add that prepossession in such trials is not easily avoided; we must eliminate with the utmost care all possible tokens, from which, by the help of the other senses or from experience, we might form a judgment of the position of the object. It is not easy to explain with certainty in what manner the auricle, through its perceptions of touch, leads to a determination of the direction of sounds; but it cannot be doubted that, as regards this function of the organ, we gradually learn to associate the different qualities of the sensations, which is the necessary result of the impact of differently directed waves on different parts of the auricle, with determinate ideas of place, just as we gradually learn by experience to form a correct judgment in respect to all the impressions received through our widely organized sense of touch.

The faculty of estimating the remoteness of a source of sound is also one which we acquire through the indirect process of experience. In many cases it is the sense of sight which enables us to form a judgment of the distance of the object which generates the sound. If we do not see that object, the judgment is only then in some degree exact when it relates to definite sounds or noises of which we have had sufficient experience to be able to estimate the diminution of intensity with the increasing distance. Thus is faithfully inculcated upon our memory the intensity of the impression of a human voice in ordinary speech or loud calling, in immediate proximity and at all distances; hence it is that we are capable of estimating with considerable correctness the remoteness of an individual from the intensity with which his voice reaches us. Various circumstances, such, for instance, as a strong wind opposite in direction to the sound, may, indeed, render our judgment uncertain; yet in this case also we possess to a certain degree experiences respecting the influence of such circumstances, which serve at least for an approximately correct estimate of intervening distances.

We hope to have conveyed to the reader of the above sketch, in as intelligible a form as possible, what is correctly known of the mechanism and action of our organ of hearing. At least, let not the inquirer who turns away unsatisfied from these pages impute it as a fault to the author that he has, so often and upon so many important points, been obliged to accuse science of ignorance. It is, on the whole, well for us whose lives are dedicated to such pursuits that science still hides under a thick veil so many precious treasures to reward the assiduous research and penetration of future explorers.

V.—THE SENSE OF SIGHT.

When his corporeal mechanism was giving way and refused further service to the exalted genius of our greatest poet, its last effort in obedience to the parting spirit was the cry: "Light! more light!" These words are ambiguous and have been differently interpreted; their sense, however, lies more on the surface than that which has been often assigned to them. There was here nothing mystical; no solemn decoration thrown around the close of a glorious life. It was the failing sight—the death of the most precious sense—which, pressing upon the yet lingering consciousness, called forth the wish implied in the expressions we have quoted. To thousands and thousands of the ordinary dwellers upon earth must the hour of death have brought the same mournful perception of withdrawing sensibility, alike whether they were still able to express it in words, or whether the organs of speech no longer obeyed the impulse, or the impulse itself were wanting; alike in whatever form, whatever words, the soul made known its last impressions. The simple expression, so often heard, "It grows dark before the eyes," is in its origin and signification wholly identical with the dying utterance of Goethe.

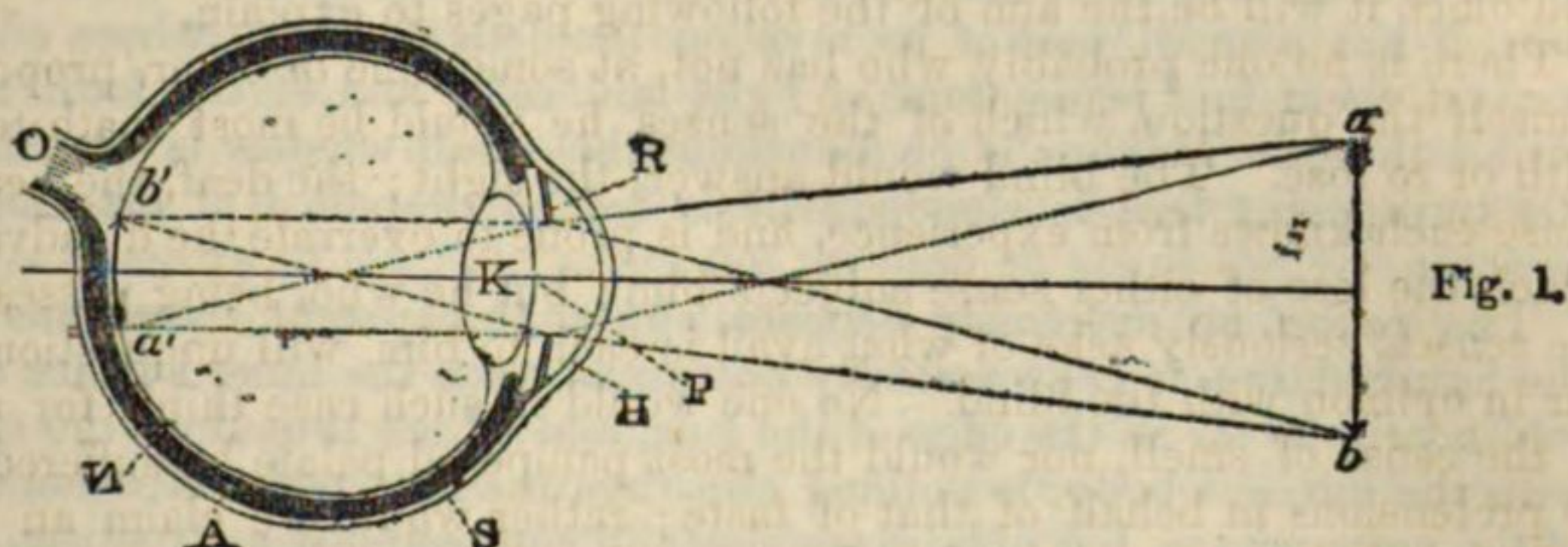
A glance at the physiological conditions of the sense of sight renders the frequent positive perception of its extinction in the case of the dying fully conceivable, while that of every other sense takes place for the most part without any distinct recognition. No one remarks when the organs of taste and smell resign their activity; few, except under peculiar circumstances, perceive when the auditory nerve loses its susceptibility to the impressions of the waves of sound which reach its extremities; and quite as few are conscious when the skin surrenders its function of recognizing warmth and pressure; but to most, perhaps to all men, whose consciousness is not extinguished before the death of the senses, the perception of a darkening of the organ of vision makes itself so urgently felt as to arouse the already slumbering consciousness to one last, painful effort, and communicates a reaction by the wonted paths to the organs of speech. But whence the prerogative of this one sense? The answer is not far to seek. No sense is during our whole life so uninterruptedly active; on none is the attention of the soul so constantly bent; the functions of no other sense supply so habitually and variously the materials of thought and imagination. So long as we are awake the eye conveys to the mind in unbroken succession images upon which it acts, whether the other senses be simultaneously in activity or repose; even while concentrating, for example, with feverish solicitude, our attention on the sensations of the ear, no impression of the sight escapes us, however evanescent may be our consciousness of the perception. While we close our eyes in order to think with less distraction—while we slumber and dream—the activity of the sense of sight continues amidst our thoughts and dreams, the objective perceptions which are wanting being supplied by subjective ones; nor do we lose in dreaming the distinction between darkness and light. What other sense can boast of being equally indispensable? Hours and even days may pass without action on the part of the sense of taste or of smell, and without atten-

tion being paid to the absence of their sensations; and although we dream of scents and of tastes, it is not with the same necessity and constancy with which we dream of objects of sight. Even the auditory nerve may long be at rest without consciousness on our part of the stillness, if no sensational momentum summons the attention to watchfulness; nor is it at all different as regards the sense of touch. Hence, because we are accustomed to hold uninterrupted intercourse with the outer world by means of the eye, and constantly to derive from its perceptions the incentives to thought and action, the perception of a failure of the visual power is unavoidable even to the parting consciousness; hence the cry of the poet: "Light! more light!" as the eyes with which he had looked through nature and the human heart were extinguished in death. The construction which I have put on the dying words of Goethe is, I think, clear and consistent, and I have placed it at the head of this essay for the purpose of impressing more deeply on the reader the inestimable value of the sense whose nature and office it will be the aim of the following pages to explain.

There is no one probably who has not, at some time or other, propounded to himself the question, which of the senses he would be most loath to dispense with or to lose. The blind would answer, the sight; the deaf, the hearing; because each knows from experience, and is prone to overrate the disadvantages to which the loss of either sense subjects him; but he who, being possessed of all the senses, seriously asks of what avail is each to him, will unquestionably concur in opinion with the blind. No one would in such case think for a moment of the sense of smell, nor would the most pampered palate be suffered to prefer its pretensions in behalf of that of taste; rather would we claim an exception in favor of the sense of touch. But enough; the eye is pre-eminently the jewel of the organs of sense! Let us seek to penetrate into its wonderful conformation. To lay before the novice an intelligible representation of the office, mechanism, and action of the eye, is, it must be confessed, a peculiarly difficult task, more difficult than a like undertaking with regard to the ear, for the reason, in part, that the learning connected with the proposed discussion is necessarily much more comprehensive than that which regards the other organs. In order to perform satisfactorily what we propose, it will be necessary to premise a careful anatomical analysis of at least the most important parts of the complicated apparatus of the globe of the eye, as well as the physical doctrine of the nature of light; the laws of its propagation, refrangibility, reflection, &c.; the relations of the separate parts of the eye to the light should be specially examined, and finally the origin of the sensations of light and the modifications of vision are to be considered; the whole to be couched in terms and in a form intelligible to the laity. We shall lose no time in a further detail of the difficulties or extent of the undertaking, but it is proper to say that no exhaustive discussion of these subjects is here contemplated; we shall be content to have explained to our readers what is most essential, and to have imparted correct views of the most important particulars.

The eye fully corresponds in its arrangements and its purpose to the so-called *camera obscura*, an instrument which we may safely assume to be generally known, especially in view of its customary employment in the service of photography. This instrument is designed to throw a distinct image of an object situated before it upon a surface placed in its background, whether this surface be a pellucid plate of glass on which we see the image as if it were painted on paper, or a sensitive sheet treated with collodion or iodized silver plate, as is practiced by photographers and daguerreotypists. In this last case, the image is fixed, by the chemical influence of the rays of light which produce the various parts of the figure, on the sensitive substance with which the plate is charged; how this takes place, we need not here explain. Whoever has seen the image of a landscape or person on the glass plate of the camera obscura, will remember that it is distinguished by two circumstances from the object it repre-

sents: first, it is considerably smaller than the object; and secondly, it is inverted; the houses in the landscape stand on their roofs, the persons on their heads; whatever in the object is to the right, in the image is to the left, and *vice versa*. For the production of this small inverted image, the glass lens placed in the anterior opening is employed, serving for the transmission of the rays proceeding from the object, but at the same time diverting them from their course in such manner that the rays proceeding from each single point of the object, which in front of the lens diverged from one another, converge behind it, so that at a certain point on the plane of the smooth tablet they again unite. This refraction of the rays of light by the glass lens will be rendered more clearly intelligible through an explanation of the formation of the image in the eye. This organ fully corresponds to such a camera obscura; under this aspect, then, let us consider its arrangement and the signification of its separate parts with the aid of the annexed figure, which represents a horizontal section of the



eye made directly through its centre. The eyeball is, in general, of globular shape, the optic nerve O being inserted, like a handle, somewhat towards the side of the nose. The outer wall of the globe is, with a partial exception, formed of a hard opaque white tunic S, called the *sclerotic*, (the white of the eye,) which answers to the wooden wall of the camera obscura, and serves as a solid protective covering. On its inner side lies a second tunic or coat, the *choroid*, which is extremely rich in blood-vessels, and is of a dark-brown or chocolate color; it is composed of three layers, the inmost of which consists of small cells, loaded with minute pigmentary granules, and so arranged with regard to one another as to resemble a tessellated pavement. The design of this dark coloring is the same with that of the black coat with which the inner wall of the camera obscura, as well as of the telescope or microscope, is furnished, namely: to prevent the dispersion of the rays of light and consequent disturbance of the perceptions of sight, as will be hereafter explained.

On the front surface of the eyeball we see, as it were inserted into the sclerotic, the transparent cornea H, arched in the manner of a watch-crystal; this forms the foremost part of the wall of the eye, and is distinguished from the rest of the integument by its transparency and greater curvature. Behind the cornea, like the dial-plate behind the watch-crystal, lies a brown or blue or gray-tinted membrane, the *iris* R, with a circular opening in its middle, the *pupil* P. The iris is, in effect, only the forward part of the choroid. The interval between the hinder surface of the cornea and the front surface of the iris is the "anterior chamber" of the eye, filled with a fluid called the *aqueous humor*. Behind the iris, and contiguous to its hinder surface, is the *crystalline lens* K, a lenticular highly transparent body, which turns its front and less curved surface to the cornea, its hinder and more convex surface to the background of the eye. The interval between this lens and the rear of the eye is filled with a perfectly transparent, albuminous fluid, of the consistence of thin jelly, called the *vitreous body*. These cursorily described parts—the cornea, the aqueous humor, the pupil, the crystalline lens, and the vitreous body

—form the different mediums through which are transmitted the rays of light proceeding from external objects to the *retina*. This last is a sensitive membrane which lines the background of the eye, and upon it the rays, after undergoing refraction in their passage through the mediums just mentioned, again unite to form an image of the object from which they issued. The convex cornea and the crystalline lens together correspond to the glass lens in the front opening of the camera obscura. The iris represents a blind or curtain which intercepts all the rays which enter through the lateral parts of the cornea and for certain reasons would disturb the formation of a distinct image, so that only the rays transmitted through the central opening of the cornea—the pupil—are permitted to penetrate to the background of the eye. The pupil, an inconspicuous opening, often scarcely a line in width, is the window through which we observe the world, or, rather, through which the world penetrates to us, since, through this aperture, everything emitting light, from the inconceivably remote to the nearest and most minute, if it falls within the sphere of vision, throws a part, if but a small part of its rays on the delicate organ whose office it is to convert them into perceptions of light and color and of the local relations of visible things. Hapless is he for whom this small window is closed, for whom the transparent lens is clouded; he is indeed despoiled of his most precious heritage.

The *retina*, an extremely delicate, almost transparent membrane, which, as the figure shows, is concentrically outspread upon the inner surface of the choroid nearly as far as the edge of the lens, and which thus lines the cavity filled with the vitreous body, is nothing else than the flattened extension of the end of the optic nerve; but of how wonderfully compounded a structure, of how admirable a distribution and stratified arrangement of the separate and delicate elements. It is impossible, in a rapid sketch, to convey to the novice a complete idea of the mechanism of the retina; we shall give, therefore, but a few outlines. The optic nerve O penetrates, with its vast number of closely compressed filaments, the outer integuments of the eye at the point of entrance, and advances to the cavity of the vitreous body; having reached this, its collective fibres bend around on all sides at right angles, and spread themselves in all directions into a beautiful network of fasciculi or bundles disposed in the plane of the retina, and reaching as far as the anterior margin of that membrane. Everywhere in this course single fibres bend around from this innermost layer of the retina to the external layers, and terminate on the outer surface of the retina in rod-like and flask-shaped or conical organizations, which, as the proper terminal apparatus of the optic nerve, enable, as will hereafter be seen, the waves of light to take effect on its fibres. The external layer of the retina consists of a delicate mosaic of these rods and cones, which are all disposed perpendicularly to the surface; it represents, therefore, a mosaic of the extremities of the optic nerve, of which extremities those situated in the part of the retina directly opposite to the pupil are most closely aggregated with one another; those, on the contrary, situated laterally to the former, stand so much the more widely apart the nearer their position to the anterior margin of the retina, a fact which we shall make use of further on. The retina thus constituted corresponds, as is apparent from the foregoing, to the smooth tablet or photographic collodion plate in the camera obscura.

To examine the texture of the rest of the organizations of the eye would lead us too far; one point, however, must not be passed without notice. Every one has probably observed, or can at any moment satisfy himself, that the pupil, which appears as a round black spot in the middle of the eye, is sometimes wider, sometimes narrower, according as the sight is exerted in obscurity or in light. The iris owes this power of changing the diameter of the pupil to certain muscular fibres, microscopically fine, which, at the excitation of the nerves leading to them, become shorter in their longitudinal diameter, and are

capable of being thus contracted to one-sixth of their original length. These fibres, similar in their nature to those of which all muscular flesh consists, pertain, in the iris, to two systems having two different directions. The one system consists of fibres which surround the pupil in circular lines concentric to its margin; the other of fibres perpendicular to the former, which radiate from the margin of the iris to the margin of the pupil. In consequence of this arrangement the operation of the two systems is necessarily as follows: If the marginal or circular fibres contract, the circle formed by them becomes smaller, and consequently the pupil, whose margin is bordered by these circles, narrower; if the radial fibres contract, they draw the margin of the pupil outwards on every side, and therefore widen the pupil. Now it is clear that the narrower the pupil the fewer will be the rays of light which can penetrate within the eye to the retina. The use of a change in the diameter of the pupil is this: if a great deal of light is thrown by very bright objects upon the eye, a part thereof is cut off by the narrowing of the pupil, in order that the sensitive retina may not be unduly excited and dazzled; if we look, on the other hand, at obscure objects, the pupil is widened in order to admit as many rays as possible into the eye, to communicate the strongest excitation to the retina and produce the most vivid sensation possible. It is a circumstance of the greatest interest that this regulation of the intensity of the light arises not through an act of the will, but with invariable certainty and proportionality through a reflex mechanism. It is the light itself which sets the mechanism in motion with a force corresponding to its own strength; the impression produced by the light on the retina and propagated by the optic nerve to the brain calls forth there an activity which, in a reflex manner, is communicated to the muscles of the iris.

Having thus given a general idea of the structure of the eye, we proceed to explain the formation of a small inverted image of the external object on the retina. In the above figure *a b* represents an arrow placed before the eye, which arrow we will imagine to be composed of a number of single luminous points arranged one after the other. Such a luminous point is *a* at one end and *b* at the other end of the arrow. Every such point emits rays of light in all directions, so that the space pervaded by these rays represents a globular sphere, of which the luminous point is the centre. If the eye be within this sphere, a small segment of it, that is to say, a small pencil of rays, penetrates into the eye, namely, those rays which fall within the circle of the pupil, while the rest are intercepted by the opaque parts of the eye. In the figure the diverging, dotted lines proceeding from *a*, and those formed of small strokes proceeding from *b*, show the limits of the pencil of rays (in transverse section) which are capable of entering through the pupil into the eye. Now, we have already mentioned that the crystalline lens and cornea together refract the incident rays from their course in such a manner that they cause the rays which, in front of them, were divergent, to approach one another in their rear, so as to unite again at a point situated behind the lens. How and by what laws this refraction takes place we cannot stop to explain. For simplification let it be supposed that the refraction of the rays is only produced by the lens; the figure will then show the rays proceeding from *a* as united behind the lens at *a'*, and those proceeding from *b* at *b'*; *a'* is therefore the image of the point *a*, as *b'* is of *b*. Between *a'* and *b'* lie the images of all the luminous points of the object between *a* and *b*; *a'—b'* then is the image of *a—b*. The figure shows further, first, that the image is smaller than the object; and secondly, that it is inverted. In the external arrow, *a* lies to the left, the corresponding image *a'* to the right; *b* lies to the right, *b'* to the left; the relative position of all the intermediate points between *a'* and *b'* will therefore be the same. In this way there is formed on the background of the eye a small inverted image of every external object from which rays pass into that organ, as a similar image is traced on the blank tablet of the camera obscura. The experimental verification of these facts is not dif-

ficult. If the eye of some animal be extracted, and both tunics, the sclerotic and choroid, be carefully detached from its posterior hemisphere so that the retina may be seen, the delicate image of any bright object presented to the eye may readily be observed on that membrane. An ingenious method has, moreover, been devised, by means of which we are enabled to see in the living eye the image of a candle-flame, for instance, thrown upon the retina. The instrument by which this is effected has been called "the eye-mirror," (*Augenspiegel*); to discuss its principle would detain us too long, but its operation is briefly this: the rays of light thrown back from the retina of the observed eye and returning in the same route by which they entered, again unite in the luminous point from which they proceeded, whence they are reflected, by the mirror, on the eye of the observer.

If we observe on the glass tablet of the camera obscura the images of objects situated at different distances from it, we perceive that only the objects which lie at some definite distance throw upon the tablet sharp and distinct images, while the images of objects either nearer or more remote have a confused and faded appearance. If we change the distance between the glass tablet and the lens, or, in other words, shove the lens forwards and backwards, the objects which were at first distinct will become obscure, while the nearer or more remote objects become alternately distinct. In a word, only the images of objects lying at a determinate distance from the lens can be at any one time distinct and well defined; hence the photographer, in order to obtain an exact likeness of a person in front of the camera, must bring the glass tablet or the sensitive collodion plate, introduced in its stead, accurately into the plane on which falls a sharp image of the object. This proceeding is grounded on the following physical facts: If we imagine a luminous point situated at some given distance before a transparent lens, such as is used in the camera obscura, the rays proceeding from that point and striking the lens unite behind the latter at a definite distance; now, if we bring the objective point nearer to the lens, the point of union of its rays will be changed, and, consequently, the position of its image, which will be thrown further back beyond the lens; if, on the contrary, we remove the objective point to a greater distance from the lens, the position of its image will be moved forward and nearer to the lens; if this objective point lies at an immense distance from the lens, like the sun, the position of its image falls upon what is called the focus or burning point of the lens; if the objective point, on the other hand, be placed in the anterior focus of the lens, the position of its image will lie at an infinite distance behind the lens—that is to say, beyond the lens the rays proceed in a parallel direction. Let us suppose now three objective points, *a b c*, placed simultaneously before the lens *L* at definite distances in a right line one after another; then the corresponding positions of their images *a' b' c'* will also lie behind the lens in a right line one after the other, but by no means at a distance from one another corresponding with that of the objective points; the latter, for instance, may be respectively ten, twenty, and thirty feet distant from the lens, the former perhaps only some lines apart. If we suppose that the blank tablet *G* which intercepts the image occupies the place at which the image of the middle object *b'* is formed this image will be distinctly defined, while the images of the nearer

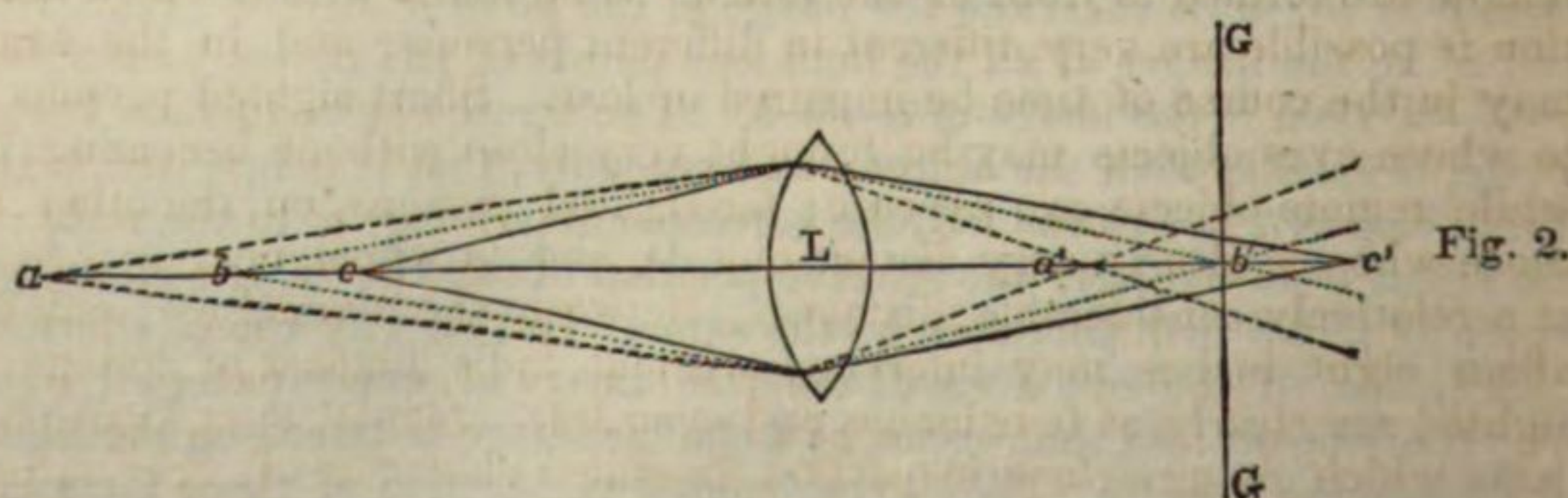


Fig. 2.

and more remote objective points will appear faded and indistinct, for the glass tablet is struck by the rays of the nearer object c before their union at the point c' by the rays of the more distant object a , after their union at the point a' , and consequently in both cases by rays diverging from one another. If we move the tablet forward to a' the images of b and c fall within so-called circles of dispersion, since the rays from both unite at a point behind the tablet. What is here said of a single objective point holds good likewise for larger objects, which are to be considered as composed of a great number of points lying near one another. Wholly conformable to this is the process in the eye: the images of several objects at different distances, simultaneously projected on the retina by the cornea and crystalline lens, fall also behind one another, so that only one of them can be in the plane of the retina, while the others fall either before or behind it, and thus present only the dim images of the dispersion circles. A simple experiment shows this: if we close the left eye and hold before the right at a certain distance a finger so that this finger shall be in a line with a remoter object lying behind it, the window for instance of an opposite house, and then fixedly regard now the finger and now the distant window, it will result that whenever we thus regard the finger the window will appear indistinctly, with dim outlines, and the finger indistinctly when we fix our attention on the window. Still more evident is the following experiment: Pierce with a needle two small openings in a card near one another, hold the openings as closely as possible before the pupil of one eye, while the other eye is closed, and observe through the openings alternately one and the other of two pins set up in front of the eye at some distance from one another; the more distant pin will now appear indistinct and double when the nearer one is attentively regarded, and *vice versa*; the pin to which the sight is directed appearing always well defined and single. The double image of the indistinct pin arises simply from this, that two separate pencils of rays proceed from it through the two apertures of the card into the eye and strike the retina, which is occupied with the pin to which attention is directed, either before their union at a single point or after it in two separate places. The eye-mirror shows in the most direct manner the different distinctness of the images formed on the retina by objects at different distances. From the foregoing experiments we learn, first, that two objects at different distances cannot be seen distinctly at the same time, and secondly, that we have the power to see at will either the nearer or more remote object with distinctness; in other words, that we have the power to adjust our eye to different distances, so that distinct images of objects unequally remote may fall just on the plane of the retina. This power has received the name of the *faculty of ocular accommodation*, and the alteration in question, which we execute for the adjustment of the eye to different distances, is termed *accommodation* or *adaption*. This faculty of accommodation is not unlimited; no eye is capable of being adjusted to all possible distances from the most immediate proximity to infinite remoteness; objects which are too near appear indistinct to all eyes in spite of every effort of accommodation, as do objects removed beyond a certain distance to most eyes; in other words, the images of objects which are too near fall, in the case of every eye, behind the plane of the retina, the images of objects too remote are formed in front of the retina. The limits within which accommodation is possible are very different in different persons; and in the same person may in the course of time be impaired or lost. Short-sighted persons are those to whose eyes objects may be brought very close without becoming indistinct, while remote objects are obscure; far-sighted persons, on the other hand, are those who see clearly very distant objects, and to whom near ones become dim at a relatively considerable distance. Between the normal eye and the object about eight inches may intervene without indistinctness of vision; the near sighted see clearly at four inches and even less. Constant occupation with objects which require close inspection produces shortness of sight; the contrary

effect results from habitual occupation with remote objects; hence we find students, engravers, &c., almost always short-sighted; huntsmen, on the other hand, far-sighted; in old age usually every eye loses more or less its capacity of seeing objects which are close at hand. We will now consider in what accommodation consists, and the mechanism by which it is produced.

We have seen in the camera obscura two means of adjustment working to the same end, the forward and backward movement of either the glass lens or the black glass tablet. For the employment of these means in the eye it is necessary either that the screen of the retina which intercepts the image should be movable in the direction of the crystalline lens, or that the lens should be capable of movement forwards and backwards as regards the retina; forwards in the case of near-sight, that the image which would otherwise fall too far behind the retina might be brought forward to the plane of the latter; backwards in the case of far-sight, that the image now formed in front of the retina might be thrown back upon its plane. In the eye the displacement of the retina alone is impossible; it cannot leave the choroid which lies behind it, nor can an apparatus for such a purpose be easily imagined. Mediatly, indeed, through a change of form of the whole globe of the eye, the distance of the posterior layer of the retina, which more directly serves for distinct vision, might be changed as regards the lens—that is to say, might be increased by such a lateral compression of the eye that its diameter from before backwards would be augmented at the expense of the transverse diameter, or be diminished by a contraction acting from front to rear. This somewhat rude mechanism of accommodation had, in fact, many advocates in earlier times, who asserted that the compression in question was effected through the small muscles which surround the eye and execute the movements of the ball. This view, nevertheless, must be regarded as wholly untenable, and was indeed contradicted by many insurmountable objections even before the true mechanism of accommodation had been discovered. The second of the above-named means, the movement of the crystalline lens, was accepted by others, though no direct proof of it could be adduced nor an answer given to the question how the fluids before and behind the lens could yield to the displacement—without a possibility, in short, of pointing out any mechanism by which this displacement could be accomplished. At present we know with certainty that in the act of accommodation the lens does not change its place. It follows, therefore, that the adjustment of the eye must take place in a different manner from that of the camera obscura. And in fact a third means remains through which the shifting of the image delineated by a lens may be brought about, a means not indeed applicable to our artificial inflexible glass lenses, but capable of adaptation to the elastic and organized lens of the eye. This means is a *change in the form of the lens*. The physical facts on which this kind of accommodation rests are briefly the following: a lens refracts rays of light more strongly the greater the curvature of its surfaces; if we have therefore a slightly curved and a greatly curved lens formed of the same glass, and an object at a definite and constant distance, the first lens refracts the rays proceeding from this object less than the last lens; the consequence is that the more strongly refracted rays unite sooner than the rays more weakly refracted; hence the point of union, that is, the image of the object, lies in the case of the strongly curved lens nearer behind it than in the case of the weakly curved lens. Thus, if we conceive an object so near the eye that its image with a given distance between the crystalline lens and retina falls behind the plane of the latter, this image will be made to move forward so soon as the surfaces of the lens assume a greater curvature, since the convergence of the rays proceeding from the lens into the vitreous body will be greater. Now this actually takes place in the eye. The eye at rest is adjusted to objects at a certain distance—that is to say, maintains habitually such a curvature that the images of objects at some degree of remoteness fall upon the retina; would we observe objects more closely, the

crystalline lens assumes a greater curvature, a curvature so much the stronger in proportion as the object is nearer, the magnitude of the curvature being in every case such as to bring the image which falls too far behind the retina just into the plane of that membrane. The correctness of this statement is ingeniously shown by means which we must be content very briefly to indicate. The surfaces of the transparent structures of the eye, the cornea as well as the lens, do not permit the passage of all the light which falls upon them; a part of it is thrown back or *reflected*; hence if a luminous object is before them, they form a reflex image of it, an image which, from physical laws not necessary to be here dwelt upon, is an exceedingly small one. Further, this little image traced on the outer convex surfaces of the cornea and lens stands upright like the object, and seems to lie behind the reflecting surface, while that of the concave surface behind the lens is inverted and occupies a position before it. The little image of the cornea is easily perceived; the lustrous appearance of the eye consists indeed in the light thus reflected. If we hold a candle flame near our head and observe the eye of another person, we shall readily perceive on its cornea the small sharply defined image of the flame. The images of both surfaces of the lens are seen with more difficulty because they are fainter and are also somewhat eclipsed by the brighter image of the cornea; besides that only a small portion of the reflecting surface is accessible to view through the pupil. Now, it is well known that the reflex image of a curved surface changes in magnitude and position according as the form of the surface is changed, as its curvature is either increased or diminished. On this fact rests the experimental proof of the change of form of the crystalline lens in the act of looking at near and at distant objects. By means of a peculiar telescope adapted to the most exact measurement, the change in position and size of the reflex image traced on the front surface of the lens may be accurately ascertained if the observed eye be alternately fixed on a far and near object at a measured distance without any change of its own position; from these measurements again has been calculated the magnitude of the variation of curvature which the surface in question undergoes in the action of accommodation. That the front surface of the lens becomes more strongly curved when viewing a near object, may be seen even without an instrument, if the eye be observed in profile; the pupil will then be seen to project further beyond the edge of the cornea; it must be understood, however, that the eye which is observed shall not in the least change its place in transferring its contemplation from the remote to the near object.

After having so far considered the eye as an optical instrument, a *camera obscura*, explained the origin of small inverted images of outward objects on its retina, and shown the means by which well defined images of objects at all distances are brought into the plane of this sensitive membrane, let us turn our attention to the proper physiological part of the problem, the explanation of *sight* itself. The existence of the image on the retina is not vision; the soul sits not in the retina, nor receives into itself this image as such without further elaboration; there is no second interior eye through which it observes the small pictures of the retina, as with our visual organ we observe the images of the camera obscura. Between the image and the perception of it there still lies a whole series of processes through which the image operates indirectly on the sensorium, so as to excite sensations of light and color and lead to a recognition of the local relations of external objects. The rays of light, united for the formation of the image, act first on certain apparatus of the retina; this apparatus acts in turn on the fibres of the optic nerve, in which are thus set in motion the mysterious couriers known as "nervous currents;" these currents flow to the brain, and take effect there on other apparatus, which stands in the more immediate service of the soul, and from whose activity the latter derives sensations and ideas. If we would explain this succession of incidents, we must begin with the first member of the series. What, then, is light? What is a ray of light which, through air or glass, pro-

ceeds from a distant object to the eye, and is propagated through the cornea, lens, and vitreous body to the retina? It is difficult usually for the laity, without some general previous instruction in physics, to acquire a correct idea of the nature of light, to disengage themselves from the deeply rooted but false notions which from childhood onwards are intimately interwoven with the idea of the luminous element. The sole property of light recognized by the uninformed, as manifested by different colors, is no property at all of light, but, as we have explained in an earlier part of these articles, is a property of the sensation which light awakens, and which has nothing in common with the external exciting cause. Without the optic nerve light is still present, but it excites no sensation, imparts no color; this paradox I hope in the following paragraph to unriddle. Light is a movement, the movement, proceeding from its point of excitation, of an ever present and all pervading ether, as it is called, which we must imagine to be composed of countless, infinitely small, inert particles. These particles are thrown into vibrations, which are propagated in the form of waves from particle to particle; such is the nature of light. Luminous bodies, like the sun, constantly set the surrounding particles of the ether in motion, and these propagate their motions from one to another on every side. Everywhere these ethereal undulations impinge upon matter; through a part of this matter, which we term transparent, they pass with more or less obstruction, the motion being transmitted to the particles of the ether contained in such bodies; through another part of matter, untransparent or opaque bodies, they are unable to penetrate, and are either absorbed or reflected as are the waves of sound from solid bodies, being thrown back in the latter case like the waves of the sea from its shores. If the ethereal waves pass from thinner into denser matter, for instance from the air into glass or water, or inversely from a denser into a thinner medium, they pursue their course undisturbed when they strike perpendicularly the surface of the second medium, but, on the other hand, are diverted or refracted from their first direction when they strike that surface at an oblique angle, and in a greater or less degree according to the difference of density of the two mediums. A further discussion of these principles of physics respecting the nature of light is here impossible; of one of the most interesting facts in this connection, the different kinds, namely, of undulatory movement of the luminous ether dependent on the velocity of the waves, we shall have occasion hereafter to speak more at large.

It is these undulations, then, of an inert, matter-penetrating ether, which, proceeding from luminous bodies to our eye, throw the particles of the ether already there into vibration, and are thus finally propagated to the retina. To transform these vibrations into a sensation of light, no apparatus less complicated is requisite than to convert an electrical current into a telegraphic despatch, which has as little in common with the generating current as the sensation of light with the exciting undulations. The sensation to which alone light and color pertain as properties is a wholly specific effect of these waves, which they can only produce by help of the apparatus of the retina and optic nerve, and of certain parts of the brain; if they strike upon wood or metal, the latter become simply expanded, and this expansion bears as much relation to a sensation of light as a telegraphic despatch to an explosion of powder, both of which may be produced by the electric current. Hence we must further inquire, what becomes of the ethereal undulations in the retina; how do they operate upon the elements of that membrane and the fibres of the optic nerve which proceed from it, in order finally to be converted into a sensation of light? Unfortunately very little is known of the chain of processes in question; respecting some links of it we have obscure intimations; respecting others not even so much. In the first place it is certain that the wave is not propagated as such in the optic nerve to the brain, but that in the retina it is converted into that movement of the contents of the nerve molecules which, in our introduction, we designated as a nervous current, and therefore into a movement of a wholly different nature; as

different, indeed, as is the electric movement which we excite by friction from the friction itself. How this conversion in the retina is brought about we know not; we can only suppose as a possibility that the waves of the ether produce, in a part of the structure of the retina, a chemical decomposition, and that through this chemical decomposition a chemical irritant is generated which excites the current in the nerve-fibres. For this conjecture nothing further can be alleged than that the undulations of light are well known to produce chemical decompositions, of which the blackening of the silver combination in the sensitive collodion plate of the photographer is an obvious example, and that certain chemical agents are capable of exciting all the nerves. Or it might be conceived that in some way, perhaps, electricity is excited in the retina by means of the undulations, and that this serves as an irritant for the nerves, for which that agent is in general the most potent of stimulants. That electricity excites the optic nerve is a well known fact; if we pass an electric discharge through the eye, a bright flash is instantly perceived. Finally, it might even be supposed that the ether-waves produced an expansion of some structure, and that this mechanically excited the nerves through the consequent pressure. In short, many instrumentalities are conceivable, but none is previously susceptible of proof, nor can one perhaps be considered more probable than another. Only one important discovery has the present age, with all its acknowledged progress, disclosed to us; we know the place of the retina in which the conversion in question is effected; we know the apparatus which is charged with effecting this conversion. It is not the fibres of the optic nerve running on the inner side of the retina, parallel to its surface, which are directly excited by the undulations, though it is upon these that the undulations first strike, before they advance to other elementary portions of the membrane; on the contrary, we know with entire certainty that the waves pass, without resulting effect, not only by these fibres of the optic nerve, but by the layers of the retina lying next behind them, until they have reached the external or hindmost layer bordering immediately on the choroid; their specific effect is therefore first exerted on the so-called columnar layer with its rod-like and cone-shaped organizations. Here the conversion takes place; the rods and cones are the apparatus on which the ether-waves in some manner operate; which apparatus next operates by some unknown agency on the nerve-fibres which bend round so as to advance to this deepest layer. It is impossible to render generally intelligible the demonstration of this statement, interesting as it is in the highest degree; we must confine ourselves to a few cursory indications. That the fibres of the optic nerve in the internal layer of the retina are not directly excited by the vibrations of the ethereal particles, follows necessarily from these among other facts—that, first, those spaces of the membrane where only nerve-fibres are found, namely, at the entrance of the optic nerve, are incapable of vision, to which fact we shall recur in the sequel; and, in the second place, that at that point of the retina with which we see most distinctly, the space just opposite to the pupil, no nerve-fibres exist; from the impossibility, moreover, of reconciling the local perceptions of the organ, hereafter to be spoken of, with the proposition that light directly excites the fibres of the optic nerve. While by these and other considerations it is placed beyond doubt, that light can as little generate a nervous current in the fibres of the optic nerve as in any other nerve-fibre, there has been direct proof adduced that it is precisely the rods and cones before mentioned on which the light operates, that it is through these organizations that the excitation is effected. If, in an obscure apartment, we look fixedly before us, while we move laterally in a circle before the eyes a burning candle, we shall perceive after some time that our field of vision becomes faintly illuminated, and in this bright field a dark arborescently ramified figure makes its appearance. The same phenomenon occurs if we move to and fro, against the bright sky and close before the pupil of the eye, a card pierced with a small

aperture. This dark ramified figure is nothing else than the net-work of blood-vessels within the retina of our own eye; hence it has been called the "choroid figure." However incredible it may seem to the laity, that we should thus perceive with the eye objects lying on the background of the eye itself, the fact is not the less true nor the less capable of explanation. It is the *shadows* of the blood-vessels traversing the retina which we see by means of the retina. Why they should seem to be outside of the eye—transferred, that is to say, to external space, like every image of the retina which excites the brain—we shall hereafter see. If we employ the second method for the production of the phenomenon, the explanation will be as follows: the narrow opening of the card presents before the eye a luminous point which sends out rays on every side, and hence a broad pencil of rays through the pupil into the eye. These rays, on account of the close proximity to the eye, are so strongly divergent that both cornea and lens cannot render them convergent by refracting them; they arrive, therefore, still divergent at the retina, and illuminate it to a considerable extent, exciting, wherever they strike, the sensitive apparatus; hence the bright field of vision. Now appear, as stated, the blood-vessels of the retina like dark shadows on a bright ground, a proof that the sensitive layer of the membrane, on which the light takes effect, must lie behind the blood-vessels, since otherwise, these shadows could not be perceived. The vessels themselves run in the layers lying next behind the nervous or internal layer; consequently, the elements of the retina which enable us to perceive the light and also the shadows as an absence of light, must lie still further back. From the degree of displacement which the shadows of the vessels undergo through a shifting of the external source of light, it has been found possible accurately to calculate how far the layer in question must lie behind the vessels, and the distance has in effect been exactly computed which exists between the vessels whose shadows we see and the external or columnar layer of the retina. This is an ingenious and striking proof, which we owe to the same distinguished inquirer who first accurately taught us the structure of the retina, together with the nature and connection of its elements distributed to different layers.

If we now proceed a step further in bridging over the chasm between the luminous wave and the sensation of light, we come to the intermediate member which has been spoken of in our previous discussions respecting each of the other senses—the current, namely, in the excited nerve-fibre, which, having been indirectly set in motion by the wave through the co-operation of the rods and cones in the columnar layer of the retina, flows through the fibrous extremities of the optic nerve in the retina and its remoter channel in the stem of that nerve, to the brain. We have so often inferred from the nature of this movement in the nerve its probable identity in all the nerves; have in so many ways pointed out that this movement in the nerve has nothing at all in common with the external irritant which occasions it—a fact which, of course, holds good with regard to the current of the optic nerve and the undulatory movement of the luminous ether—that we shall spare our readers any unnecessary repetition. We may also abstain from anything more than a simple allusion to the wholly unsolved problem of the further destiny of this current, on its arrival at the brain, in the interior apparatus of the excited nerve. We know only that the current of the optic nerve takes effect on this extreme cerebral apparatus, consisting of the bulbous bodies heretofore described, in a peculiar manner, inducing therein some modification which gives rise in the mind to a sensation of light, just as the corresponding modification in the terminal bulbs of the auditory nerve produces a sensation of sound. Whether any solution of these seemingly impenetrable mysteries is reserved for human ingenuity can only be known to future times.

Before proceeding to treat of this simple sensation of light in its connection with objective ideas, we must consider the different *qualities* of the sensation.

These qualities are the different sensations of color. We distinguish white, red, blue, green, yellow light; we speak of white, red, and other colors of the objects which we see—that is to say, we confer the special property of the sensation which we call color on the external object by which it is generated—with the same incorrectness with which we attribute the properties of light in general to external objects. Now, what this blue or green, this red or yellow color is, can no one say; we can as little describe the qualities of a sensation of light, as the qualities of any impression received through the other senses; and how impossible this is has been sufficiently shown in previous essays. Meanwhile the true image of every sensation of color is indelibly fixed in all memories, so that at any moment we can recall the idea of each several quality, or assign its appropriate color to every object which presents itself; but no one can specify any distinctive sign pertaining to the sensation itself, whether of blue or green; no one knows whether his own perception of blue accords with that of another individual. In common life it is customary to speak of a black color, and even in science it is sometimes doubted whether black should not be called a color; that is to say, a sensation. In my opinion there is no room for such a doubt. Black is nothing but the absence of a perception of light. We call those objects black from which no light proceeds to our eye; we perceive them as gaps in the illuminated field of vision, being conscious, by virtue of the sense of space resident in the retina, of the particles of that membrane which remain in repose and unexcited, between those particles which are struck and irritated by the light. If we exclude all external light from our eyes, the whole field of vision appears black; we are conscious of the repose of all the particles of the retina. But to enter more particularly into the details of this controversy, whether black be a sensation or not, would lead us into too long a digression.

If we turn our consideration to the external causes of the different sensations of color, so indescribable and inexplicable in themselves, we are met by an entirely conclusive and exact physical theory. The different sensations of color stand in relation to their causes in the same category with the sensations of sound of a different pitch; it is the *frequency* of the vibrations of the particles of the luminous ether, the *length of its waves*, by which the quality of the sensation is determined; to each definite color belongs a definite, exactly measured length of wave and frequency of vibration, as to every sound of definite pitch belongs a definite number of vibrations of the body which generates it. Physics has demonstrated that the white light of the sun—that is, the vibrations of the ether proceeding from the sun which taking effect on the retina produce the sensation of a white color—is no uncompounded light, but consists of a great number of the ethereal vibrations differing in the degrees of their frequency; it has further taught us to decompose this compound light into its several constituent parts. If a sunbeam be received through the edge of a three-sided prism of glass, while this edge, for example, is held before a small round opening in an opaque screen upon which the sun shines, there will appear on a surface situated behind the screen not a round white spot corresponding to the opening, but a long bright stripe in which the different colors of the rainbow follow one another in the same order as in the rainbow. One end of this stripe will be occupied by a red portion, followed by an orange, a yellow, a green, a blue, an indigo and a violet colored portion in succession, the latter occupying the other end of the stripe. The origin of this prismatic stripe consists in this: that the waves of different vibratory velocities compounded together in the white light of the sun, on their way through the edge of the prism, are diverted, each in a different degree, from their course, so that those waves in which the ethereal particles vibrate most swiftly are most diverted or *refracted*; those whose particles vibrate most slowly are least refracted; if we imagine, for example, the white solar ray striking horizontally on the prism, all the waves combined therein will, when the edge of the prism is directed upwards, be so refracted as

to pass obliquely downwards to the other side, but the slowest with least, the swiftest with most obliquity. It results that the undulations differing in their velocity strike, one after another, on the intercepting screen. The different colors of different portions of the stripe proceeds from this: that the waves reflected from the screen to our eye operate differently on the nervous apparatus of the organ according to the velocity of their vibrations, so that each generates for itself a definite modification of the nervous current, and every such modification a definite quality of sensation; that is, of color. The longest waves with the least vibratory velocity, which reach the eye from the upper end of the stripe, and which hence, in the image on the retina, form, through the inversion of the image, the lower end of the stripe, so operate on the nerve-exciting apparatus that the sensation of a red color is the result; the shortest and swiftest waves from the other end of the stripe (which stripe is called the solar spectrum) produce in the same way the sensation of a violet color; the waves of intermediate length and velocity give rise in succession to the above-named intermediate sensations of color. And the same is the case not merely with the waves directly disengaged from the sun's light, but with those issuing from every visible object. An object appears red when the waves proceeding from it are so constituted that each particle of the ether lying in its course executes only 439 billions of vibrations in a second of time, while each wave is the seventy-thousandth part of a millimetre in length; if the wave be only the sixty-thousandth part of a millimetre long, while, on the other hand, its particles vibrate 697 billion times in a second, the object from which it proceeds will appear of a violet color. The observed object is hence neither red nor violet; it only throws the particles of the ether lying between itself and our eye into vibrations of definite velocity, according to which they excite in our mind, through the medium of the retina and optic nerve, the sensation of red or violet. In like manner we erroneously seek the sound we hear in the vibrating string, while the string simply vibrates; the sound first exists in our sensation, occasioned by the waves of a definite frequency of vibration proceeding from the string. It is, in fact, the general error as regards all perceptions of the senses that we ascribe the quality of the sensation to the exciting external cause; a necessary error, however, through which our sensations become first available for the practical uses of life, as we have repeatedly shown on previous occasions. To return to our theme: Each solar ray, which the prism decomposed into seven undulatory elements distinguishable by their color, comprises other waves besides the colored ones. In the white solar light there are ether waves of yet slower vibration than those which produce the sensation of red, and such as are of yet greater vibratory velocity than those which yield a violet color. In the spectrum, therefore, formed by the prism, there are waves (the longest) which strike beyond the red extremity, as well as others (the most frequent) which strike beyond the violet extremity; but these we do not see, although constituted precisely like the rays of color, except as regards the difference of length. In other words, only those waves of the ether, the number of whose vibrations falls within certain limits, (434-697 billions,) are capable of so affecting the apparatus of the retina as to produce excitation of its nerves, and therefore a sensation; while, on the other hand, as well those whose number of vibrations is too small as those whose number is too great, are not qualified to excite a sensation. Again a complete analogy with the nerves of hearing! If the vibrations of a string are calculated to excite the auditory nerves so as to produce sound, there are equally limits to the number of vibrations which must not be transcended; the string must not oscillate from side to side less than sixteen times, nor more than 64,000 times in a second. If it vibrate less often or more frequently, it sounds no longer. But how, will the reader ask, can it be known that beyond the visible there are present invisible waves of light? How can light be recognized which is not

seen? For this there are several excellent means which we will briefly notice. In the first place, all ether waves have the power of giving *warmth*—that is to say, of exciting, when they strike the nerves of touch, the sensation of warmth—of causing matter to expand; in short, of producing all the effects attributable to heat. In other words, heat and light are the same, both consisting in the vibrations of that elastic medium known as the luminous ether. The power of warming is not, however, proper to all vibrations of the ether in an equal degree; the vibrations which are too slow to excite the nerves of vision, and which hence, in the spectrum, fall outside of or beyond the red, possess that power in a high degree; we recognize them by their action upon the apparatus for measuring heat. In the second place, the rays of light have the power of producing, by their action on certain substances, chemical decomposition; for instance, of rendering black certain combinations of silver. This chemical effect pertains in the highest degree to the most rapid vibrations of the ether, and therefore to those invisible vibrations which fall beyond the violet; we recognize their presence by their chemical effect. They are to be recognized, however, in other ways, being capable, for instance, of becoming visible, with a blue color, when, by certain means which we possess, but which we cannot stop to explain, their vibrations are rendered slower. Under favorable circumstances, indeed, when enabled to operate with great intensity on the eye, they become, even without abatement of frequency, directly visible; that is to say, when they take effect very strongly on the optic nerve they are capable of exciting it.

Such, briefly, is the physical theory of the origin of sensations of color. With this are further connected some important physiological considerations. We have proved at large that light and color exist not externally, but are entirely qualities of sensation, conditioned by the nature of the optic nerve and its perceptive apparatus in the brain. A sensation of light, therefore, may be determined not merely by the impact of a wave of the luminous ether on the retina, but by any excitation of the optic nerve, of whatever kind it may be, provided it strike the extremities of the nerve in the retina or its stem and the current be evoked in its fibres. It has been already mentioned in passing that the strongest irritant of all nerves, the electric current, produces, when directed through the eye, intense perceptions of light, or, to speak more exactly, a bright flash at the moment of commencing and ceasing, a radiant yellow and violet colored image during its continuance. Pressure on the nerves of sight or their division, sometimes required by morbid degeneration of the eyeball, also produces a sensation of light. Even mechanical irritation of the retina induces the phenomenon. Every one may recollect from experience that a blow or thrust against the eye is attended with an appearance of sparks, but the fact may be verified at any moment by a more commodious experiment. If the eye be closed and a finger end pressed against the lateral parts of the eyeball, and therefore against the sclerotic coat under which lies the retina, a bright circle will appear in the darkened field of vision; not, however, at the point of pressure, but in the opposite part, as, for instance, towards the nose when the pressure is on the side next the temple, underneath when the pressure is from above. We will inquire further on, why this transposition of the perception should take place. To adduce still another example of these luminous apparitions through mechanical irritation of the optic nerve: When from physical affections, spirituous potations, or morbid excitement a determination of blood to the head takes place, fine luminous specks are apt to glimmer before the eyes, the particles of which float confusedly in the field of vision, and most distinctly when the sight is directed to a bright sky or attention is paid to the phenomenon with the eyes closed. This glimmering arises from over fulness of the blood vessels traversing the retina itself; the loaded vessels and probably the single corpuscles of the blood which permeates them exert a pressure on the elements of the retina lying behind them and thereby produce the excitation of the optic nerve. Once more:

Light and color are specific qualities of sensation, the result of the activity of the nerves, through whatever means that activity is called forth, whether by ethereal undulations, electricity, or mechanical agency. But as the nerves of touch are destined for excitation by pressure, heat, and cold, the auditory nerve for excitation by the waves of sound, and both are arranged with a view to the impression of these agents alone, so the optic nerve is not designed for mechanical or electrical irritation, but is exclusively destined and contrived for excitation by the waves of the luminous ether. Hence that wonderfully perfect optical apparatus before the retina, which conducts the rays of light and disposes them for the formation of exact images; hence the complicated and as yet imperfectly understood apparatus of the retina itself, by which the vibrations of the luminous ether are enabled to transmit their specific excitation to the optic nerve, while for the electric current or for pressure no such enabling apparatus has been provided, but both agents must act immediately on the naked fibres of each nerve in order to set in motion their respective currents.

So much for the origin of a simple sensation of light in general and of its qualities specifically. In relation to the latter, namely, the colors in which observed objects appear to us, we must call attention to some highly interesting but as regards their nature not wholly explained facts, which are known in part to every novice, but often pass without consideration. The same object does not always appear to us of the same color; although the waves of light proceeding from it are the same, the quality of the sensation is in some manner changed in conformity with the color of the objects simultaneously perceived in close proximity with it. If a red wafer on white paper be attentively observed for some time, it will be seen that the paper around the wafer appears no longer of a pure white, but assumes a greenish hue and at length a red tint like the wafer itself. If we look at a white wall through a hole in a green paper it appears at first of a reddish color, but afterwards of a greenish hue like the paper. These experiments may be varied at pleasure. Even black objects, from which no light is emitted into the eye, appear on a colored ground not black, but perceptibly tinted—green, for instance, on a red ground, and green also on a green ground. As already intimated, no certain explanation has been given of these facts.* We know only that the red or green color of the white ground around a green or red wafer is not objective—that is to say, that light-waves of the corresponding velocity do not pass from the paper into our eye, but waves of the same compound (white) light, as when we observe the paper alone. Hence the color of the paper is *subjective*—that is to say, it depends on a peculiar mode of perception by our own mind. The mind conceives white to be green when it appears beside red, to be red when it appears beside green. Red and green form for our mental perception contrasted (complementary) colors; so likewise do blue and yellow, &c. In the white light of the paper, as has been shown, all colors are contained; it may well be, therefore, that when we see red near white we overlook in the compound white the red ingredient and more clearly perceive the complementary color, the green ingredient; single it out in some measure from the mixture and substitute it for the objective white, of which it is a part. This is the commonly received explanation, but it is not full one. It is still more difficult to account for the colors which black objects assume on a colored ground, for here the question no longer relates to the different interpretation of the quality of a definite sensation, but to the perception of color by the retina, when in fact no light falls on it. Black is no color. When we see therefore black objects colored, our perceptive faculty must conceive a sensation of definite quality without any apparent objective cause; how this comes to pass, what, as regards the mind, is the provocative thereto, and why the conceptions of color in this case maintain a constant quality in relation

* See article on Subjective or Accidental Colors.

to the colors of the background is an enigma which it is not at present possible fully to solve.

A second series of interesting facts consists in the so-called *secondary images*. When an impression of light strikes the retina, the sensation thereby generated does not vanish instantaneously with the cessation of the impression from without, but subsists yet a short time longer. A number of familiar phenomena admit of being referred to this fact. When a wheel turns very rapidly we no longer distinguish the single spokes—it appears as a full disk; when we whirl a glowing coal rapidly around we do not see the coal gradually advancing as a bright point; it presents a closed circle of light; that is to say, we see the coal simultaneously at all points of its progress. Whence is this? It results simply from the persistence of the impression. The coal produces at each point of its course a sensation of light which endures for a moment, while the coal itself has already moved forward. If we imagine the coal at the uppermost point of its circuit, the sensation generated at this point still endures, that is, we still see the coal at this uppermost point, while it has already moved a space further, and has generated sensations from the following points, which again continue a moment beyond the time of its presence at any given point. With a certain velocity of rotation, it will follow that the sensation produced at the first point still persists when the coal has performed its whole circuit, again arrived at the uppermost point, and there generated the impression anew; and since the same is the case with each successive point, the image presented to our eye is, of course, that of a circle of light. The same holds good with regard to the revolving wheel. A further interesting example is the following: We have seen that white light is compounded of seven colors—those, namely, of the rainbow; in other words, a ray of light which generates in the eye the sensation of a white color is composed of seven luminous undulations, differing in the vibratory velocity of their ethereal particles, each of which undulations, when it strikes the eye separately, generates the sensation of a peculiar color. Now, if we take a disk, divide its surface from the centre outward into seven compartments, color these successively with the tints of the rainbow, and in the same order, the first red, the second orange, &c., and then cause the disk to revolve very rapidly, it will appear to the eye to be white, or, at least, gray. After what has preceded, the explanation is simple. Through the rapid movement of the disk the several colored rays strike so quickly one after another upon the portion of the retina on which the image is traced, that the impression of the first ray is not yet extinct when the remaining six have already struck upon the same sensitive points, whence the retina is simultaneously excited by the seven rays, and a perception of whiteness is the consequence. From this simple persistence of the original impression we should distinguish the secondary images which sometimes occur in a narrower sense of the word; phenomena which, like the former, are familiar to every one from experience. Who has not looked upon the setting sun, and then perceived the persistent after-images which occupy the field of vision wherever the eyes may be turned, and vanish not even when they are closed; which, on the contrary, then appear vividly and arrayed in different colors, red, blue, &c., while to the open eye, directed, for instance, towards the bright sky, they seem projected as a dark object on the back ground. By attentive observation and some practice many analogous phenomena of great diversity and interest may be observed. We confine our exemplification to an easily repeated experiment. If we place a red wafer (or red paper) on a white ground and observe it attentively for some time, then suddenly turn the sight laterally to the white surface, we shall plainly perceive an after-image of the wafer of a green tint, which follows the eye when directed to different parts of the back ground. If the object thus fixedly observed be blue, the secondary image will be yellow; in a word, it will be always the so-called contrasted or complementary color which presents itself in this image, and always darker

than the bright ground on which we observe it. If this ground be colored, the color of the secondary image varies in different ways which we need not specially describe; a blue wafer, for instance, observed on a yellow ground yields, when the eye is turned to a white surface, a yellow image of the wafer on a blue ground.

It has already been said that these images display themselves not only to the open, but to the closed eye, and with the most surprising alternation of colors and brightness, so that, after the observation of some definite object, these repeatedly change, in the secondary image, in a regular series, until, growing weaker and weaker, the image finally disappears. The following is an example of this series of appearances, but it should be premised that by most eyes they are only perfectly recognized after long practice and familiarity; but then so plainly and readily that the secondary images obtrude themselves among the perceptions without particular attention, and often mingle inconveniently and annoyingly with the direct observations of sight. If we observe persistently a bright-colored object—for instance, a bright candle flame through red glass—and then closing the eye, direct our whole attention to the dark field of vision, the secondary images of the red flame will present themselves in the following succession: First, the original appearance subsists, like every impression of the retina, for a very brief moment; next, though so evanescent as to be almost always overlooked, appears a bright green image of the flame on a dark ground; this gives way to a bright red image of the flame, also on a dark ground, to which succeeds a dark green image on a bright ground; then again a bright red on a dark ground; again, a dark green on a bright ground; and this alternation proceeds until the whole phenomenon closes with a faint, dark green image on a bright ground. Thus secondary images of like color and like relations of brightness with the object are interchangeably mingled with those which appear in the complementary colors of the object, and in which what was dark in the object (the ground) is bright; and, inversely, what was bright (the flame) is dark. Secondary images with such inverted relations of brightness are termed negative; those in which these relations are direct are termed positive. Indescribably gorgeous is the play of colors of these images in the closed eye after the contemplation of the sun itself. The positive image appears not white like the sun, but assumes, one after the other, the most various and brilliant colors. First, it appears of a bright blue with orange-colored border, then blue, violet, deep red, with always differently tinted edges. Yet, however beautiful and surprising these images of the sun, we should warn every one against a protracted observation of that luminary; the experiment is extremely hazardous for the eye; the dazzling solar light over excites the retina and paralyzes the vision; the images once seen follow the observer with painful pertinacity. The most striking attestation to the danger of such observations is found in the fact that the inquirer who, with unwearied assiduity, first thoroughly investigated these phenomena, soon grew blind, and has not yet fully recovered his sight. To many of our readers he is not unknown; under the name of "Mises" he has endowed German literature with many highly poetical creations; and whoever, among his attractive writings, has met with the touching poem, "*Der Schwarze Vogel*," (The Bird of Gloom,) will read it with double interest when he knows that it sprung as a mournful effusion from his heart, when, in consequence of his experiments, the veil of blindness was falling upon his eyes. We renounce any further discussion of the details, as well as an enumeration of the differently modified experiments relating to secondary images, and unfortunately must, at the same time, renounce the purpose of explaining the nature of the phenomenon itself, and the changes which it undergoes under different circumstances. There are theories upon the subject, but none which are entirely satisfactory. So much, indeed, we know, that these images are no dream images, but secondary and necessary effects of the activity of the optic nerve and its ter-

minal apparatus in conformity with natural laws ; more than this we shall never be able to establish until we have succeeded in explaining the nature of that nervous activity itself.

We have thus pursued our subject, so far as it relates to the proximate performances of our organ of vision, as far as this is at present practicable ; we have seen the undulations of the luminous ether penetrate through the dioptric screen of the eye and the rays of light unite in the surface of the retina into images of outward objects ; we have seen, finally, sensations of definite quality arise from those etherial undulations, by means of the apparatus of the retina and the terminal apparatus of the optic nerve. But these simple sensations are by no means visual perceptions, are in themselves no communications to our minds from the outer world of its existence and its action ; they are but dead letters, which must first be reduced to living speech. As with all the rest of the senses, so here the naked sensation is but a special accident of our consciousness, which must undergo further elaboration, be interpreted by indirect means, and connected with appropriate ideas, before we can realize its inappreciable value. Only by our learning to refer the sensation of light to the external object which occasions it, thus giving it objectivity, only by our learning to associate with the simple sensations ideas of the local relations of external objects, is sensation transformed into vision. What would it avail us that every object from which a luminous undulation proceeds should cause a sensation which might be of red, or green, or other color, according to the length of the wave, if this sensation remained a purely subjective feeling, disclosed to us nothing respecting the source from which it came ; to what purpose the wonderful arrangements which unite the rays of light on the retina into a faithful image of the object whence they proceed, if this image could not act upon the mind in such a way as to make it sensible of the relations of the object in outward space, its form and magnitude, its position and movement ? The laity are not generally accustomed to distinguish clearly the sensation from the associated idea, and therefore overlook the wide chasm between a sensation of sight and *seeing*. We will attempt to overbridge this chasm as briefly and intelligibly as possible ; and we may the better afford to be brief, since we have already treated at large, in reference to the sense of touch, of the process by which objectivity is conferred on our sensations and of the origin of our local preceptions.

We transfer every impression of the sight to the outer world, even those whose cause exists in the eye itself ; we refer none to our organ of vision ; the gleam of fire which strikes the eye, as well as the flash occasioned by an electric stream directed through it, seems to us to be outside of the eye. While, as regards the sense of touch, we arrive at a perception of the sensitive surface, and hence of the organ on which the impression takes effect, as a general thing we never attain, in the case of the sense of sight, a consciousness of the perceptive surface of the retina, the organ of this sense ; never perceive an image formed on that membrane as cause of the sensation we experience. It was for science first to investigate and verify the existence of such a surface and image ; and notwithstanding this, the physiologist himself is as little capable as the novice of transferring his own sensations to the membrane of the retina. And why ? There are circuitous means, already discussed in our doctrine of the sense of touch, by which we attain in childhood to the conviction that there is space external to ourselves and outward things as opposed to our own personality ; that these outward things are the causes of those conditions of the mind which we call sensations. But while, as regards the sense of touch, we are enabled, through the double sensation which arises from the touch of one part of the surface by another, to distinguish this surface from outward things, no such resource is available as regards the eye, because the means thereto, the power of testing the organ of vision with the organ of vision itself, is wanting ; we learn to refer the sensations of sight directly and exclusively to the external

objects. This mode of interpretation once established, we are thenceforth its slaves ; we can never again free ourselves from its influence nor conceive of a sensation of light as purely subjective, and without the idea of a causative external object to which it is referable.

Yet this reference of the sensations of light to the outward world is still not a complete act of vision ; for this there is further required the perception of the local relations of the external things to which we refer the sensations. And here the organ of sight offers a complete analogy with the organ of touch. We must conceive of our retina as a mosaic of sensitive points, just as our outward skin was shown to be ; according to the specific coloring which each of these sensitive points imparts to the sensation called forth by it, does the mind recognize the place in outer space at which it is to seek the object of the sensation.

In conception the space embraced by the field of view is distributed into just so many compartments as the mosaic of the retina comprises points of sensation ; if one of the latter be struck by an impression of light, we refer the sensation to that compartment of the field of vision which corresponds to the point struck. If a series of points of the retina which lie in a right line be struck simultaneously we refer the impressions to those compartments of the ideal mosaic which lie in the corresponding right line. If an image of a sphere, of the moon, for instance, be delineated on the retina, the points of the retina which are struck lie in a spherically bounded surface contiguous to one another, and the same is the case in the field to which our idea transfers the sensations belonging to the several points ; hence it is that in the first case we see a right line ; in the second, a sphere. If the retina be simultaneously struck by light at two points separated from one another, each of these impressions connects itself with the appropriate idea of locality. We see two distinct points of light and comprehend their severance from one another, since we are conscious of the mosaic particles of the retina remaining unaffected which are situated between the two that are struck ; we mentally enumerate these, and from their number form a judgment of the intervening distance. If we observe two objects, one after the other, the image of the first of which covers four, that of the second eight sensitive points on the retina, we estimate the magnitude of each of them and their relative proportion according to the number of sensitive points which are struck, or rather according to the number of the compartments embraced in our ideal field of vision, which in both cases we have filled up with our sensations. In this manner we arrive at the perception of the form and size of observed objects, but always without being conscious of the mediator between the object on the one hand and the sensation and idea on the other, the image, namely, on the retina with its local relations ; always without attention to the mental operation by which we have once laboriously learned to clothe the simple sensations with the ideas of form and magnitude.

For a clearer explanation of the local perception, we have called to our aid the hypothesis that the retina represents a mosaic of sensitive points ; this hypothesis it is proper that we should now a little more closely examine. Physiology must take it for granted that each of the countless minute filaments of the optic nerve, which, packed together in its stem, are afterwards dispersed over the retina, there terminate in a peculiar apparatus ; that the terminal apparatus of all these filaments lie, arranged near one another, in the plane of the retina, like the pieces of a delicate mosaic work ; and that each apparatus represents in reality a sensitive point endued with the nature and properties which we have supposed in our explanation of the local perceptions of the organ. If this be the case, everything is easily explained, and the results of the most recent microscopic investigations permit us to conclude with almost entire certainty that the retina is, in fact, such an anatomical mosaic of distinct nerve-ends, that the rod-shaped and conical appendages of the nerves in the hindermost layer of the retina form respectively just such sensitive points as we have supposed. Let it be assumed, then, that

every nerve-fibre terminates in a cone, and can, as is really the case, only be excited by the light through this organization; the above explanation may then be interpreted as follows: Each cone elaborates the luminous wave which strikes it into an irritant of the nerve, which sends a current to the brain, and there evokes a perception of light. The current is essentially the same in all the nerve fibres from the similar constitution of the waves, but it is characterized in each fibre by some modification, some *nuance*, however slight it may be, which definitely distinguishes it from the current in all the other fibres; this modification is imparted to it by the appendage in some manner wholly unknown to us. It is this modification of the nervous current, and the sensation thereby generated, which we learn to interpret as a token of the place in the field of vision, to which we must assign the perception; how this is effected has been shown in our remarks on the sense of feeling. The shading of the sensation, which an impression on the central cones situated opposite to the pupil produces, we have learned to connect with the idea that the object to which we refer the sensation lies in the middle of the field of vision, and it is from the same specific shading or modification of the sensation that we determine the relative position of the other points in that field. This brings us to a further interesting question pertaining to this head of our subject. When the novice is informed that all outward objects are portrayed on the retina in an inverted position, it seems to him incomprehensible why we should see the objects upright, as they really are, and not inverted; indeed, up to the latest times there have been physiologists who, in order to clear up this seeming contradiction, have taken great pains to find some anatomical or physical mechanism for once more reversing the image of the retina. This is wholly unnecessary; such a mechanism were only to be thought of, if we perceived the image as such and its inverted position were capable of directly acting upon the sensorium. But that, as we have seen, is not the case. Notwithstanding the inversion of the image, the fact that the object is seen upright admits of the most simple and natural explanation, when we accept the fact that we connect with the excitation of a sensitive point lying to the left in the retina the idea of a cause of the sensation lying to the right in outer space, and have learned in like manner to refer the excitation of a point below to an object situated above. If we consider how ideas of place come to be connected with the sensations of sight, we must see that it cannot be otherwise. An object which we see we can at the same time touch, and from the position of our organ of touch can determine, in the manner formerly pointed out, the position of the object in space. When we know that, in order to reach a point which has evoked a sensation, we must move the touching finger in the direction which we call to the right, we refer the visual sensation also to the right in outer space, unembarrassed by the fact, of which we are wholly unconscious, that the impression of the light has been received on the left and not on the right of the retina. As we formerly saw, it is the appropriate sensations connected with the movements of our limbs, whose surface is sensitive to the touch, from which we form a judgment of the direction of the movement and the position of the objects touched. Now the eyes also are movable; their movements are connected with the feeling of movement like those of our arm, and this feeling we learn to interpret and to use for the formation of ideas. We know, if our sense of vision has once been educated, that an object lies to the right of us, when, in order to perceive it clearly, we must turn our eyes to the right—that is to say, when the movement of the eye creates a muscular feeling, which we have learned to recognize as a movement to the right. These muscular feelings which accompany the movements of our eye are, in yet another relation, highly important auxiliaries to the perceptions of sight, and in a manner wholly analogous to the sense of touch. They instruct us respecting the size, form, and distance of observed objects and the direction of their movements. Not to

dwell too long on details, we will illustrate this by an example. Suppose a circular object before us. If it is small, so that we can survey it with the eye unmoved, we at once perceive its form through the sense of relative position exerted by the retina; or, in other words, from the circumstance that the points of the retina occupied by its image lie in a circular line. But if it is so large that we cannot embrace it in one view, we proceed as follows: We so direct our eye that first the image of its uppermost point shall fall upon the central point of the retina; we then move the eye so that the image of the following point shall fall upon the same place, and so on, till one after another the images of all the single and successive points of the ring have made their impression upon the same sensitive portion of the retina. That in this process the impressed place of the retina has remained the same, we learn from the continuance of the local coloring of the sensations; that the object has a circular form, we gather from the muscular feelings which have accompanied the movement of the eye, and which we have learned to refer to a circular movement. Since these muscular feelings inform us also of the magnitude of the movement executed, we form therefrom a judgment respecting the size of the observed circle. If we would estimate the distance of two observed points from one another, we either enumerate, in the manner heretofore explained, the number of the mosaic elements of the retina, which remain unaffected between their images, or we direct our eyes so that first the image of one point shall strike the middle of the retina, and then move the eye so far that the image of the second point shall strike upon the same place, and now compute the interval between the two from the muscular feeling which attended the executed movement and which assists us to form an idea of their direction, size, &c.

We might draw out these remarks to greater length, and initiate our reader, if he had the patience longer to accompany us, still more deeply in the mysteries of the eye; but we limit ourselves to what has been said, because it has seemed to us, under the circumstances, a duty to restrict ourselves to what is of most importance, as well as because many other points would appear to offer too much difficulty to be made either intelligible or interesting to the general reader. There are certain limits beyond which the popular exposition of the natural sciences is impossible, and must partake more or less of the character of charlatanism. To him who has followed us we hope to have sufficiently shown that it needs not a glance towards the inconceivably distant worlds of the nocturnal heavens to be sunk in devout astonishment before the marvels of creation, but that the smallest organ of our bodily frame offers a subject of still more wonder, and, because more accessible to our understanding, of a yet higher degree of interest.

LECTURE ON THE RESULTS
OF
SPECTRUM ANALYSIS APPLIED TO THE HEAVENLY BODIES,

DELIVERED BEFORE THE

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. AUGUST 23, 1866.

BY WM. HUGGINS, F. R. S., ETC.

AN important invention or discovery seldom, if ever, remains sterile and alone. It gives birth to other discoveries. The telescope and the microscope have led to remarkable discoveries in astronomy and in minute anatomy and physiology, which would not have been possible without those instruments. The observation that a magnetic body, free to move, arranges itself nearly north and south, has not only contributed immensely to the extension of commerce and of geographical discovery, but also has founded the important science of terrestrial magnetism.

This evening I have to bring before you some additions to our knowledge in the department of astronomy, which have followed from a comparatively recent discovery. The researches of Kirchhoff have placed in the hands of the astronomer a method of analysis which is specially suitable for the examination of the heavenly bodies. So unexpected and important are the results of the application of spectrum analysis to the objects in the heavens that this method of observation may be said to have created a new and distinct branch of astronomical science.

Physical astronomy, the imperishable and ever growing monument to the memory of Newton, may be described as the extension of terrestrial dynamics to the heavens. It seeks to explain the *movements* of the celestial bodies on the supposition of the universality of an attractive force similar to that which exists upon the earth.

The new branch of astronomical science which spectrum analysis may be said to have founded, has for its object to extend the laws of terrestrial physics to the other phenomena of the heavenly bodies, and it rests upon the now established fact that matter of a nature common to that of the earth, and subject to laws similar to those which prevail upon the earth, exists throughout the stellar universe.

The peculiar importance of Kirchhoff's discovery to *astronomy* becomes obvious if we consider the position in which we stand to the heavenly bodies. Gravitation and the laws of our being do not permit us to leave the earth; it is, therefore, by means of *light alone* that we can obtain any knowledge of the grand array of worlds which surround us in cosmical space. The star-lit heavens is the only chart of the universe we have, and in it each twinkling point is the sign of an immensely vast though distant region of activity.

Hitherto the light from the heavenly bodies, even when collected by the largest telescope, has conveyed to us but very meagre information, and in some cases only of their form, their size, and their color. The discovery of Kirchhoff enables us to interpret symbols and indications hidden within the light itself, which furnish trustworthy information of the chemical, and also to some extent of the physical, condition of the excessively remote bodies from which the light has emanated.

We are indebted to Newton for the knowledge that the beautiful tints of the rainbow are the common and necessary ingredients of ordinary light. He found that when white light is made to pass through a prism of glass it is decomposed into the beautiful colors which are seen in the rainbow. These colors when in this way separated from each other form the *spectrum* of the light. Let this white plate represent the transverse section of a beam of white light travelling towards you. Let now a prism be interposed in its path. The beam of white light is not turned aside as a whole, but the colored lights composing it are deflected differently, each in proportion to the rapidity of its vibrations. An obvious consequence will be, that on emerging from the prism the colored lights which formed the white light will separate from each other, and in place of the white light which entered the prism we shall have *its spectrum*—that is, *the colored lights which composed it, in a state of separation from each other*. Wollaston and Fraunhofer discovered that when the light of the sun is decomposed by a prism, the rainbow colors which form its spectrum are not continuous, but are interrupted by a large number of dark lines. These lines of darkness are the symbols which indicate the chemical constitution of the sun. It was not until recently, in the year 1859, that Kirchhoff taught us the true nature of these lines. He himself immediately applied his method of interpretation to the dark lines of the solar spectrum, and was rewarded by the discovery that several of the chemical elements which exist upon the earth are present in the solar atmosphere.

It is my intention to bring before you this evening the results of the extension of this method of analysis to the heavenly bodies other than the sun. These researches have been carried on in my observatory during the last four years. In respect of a large part of these investigations, viz., those of the moon, the planets, and fixed stars, I have had the great pleasure of working conjointly with the very distinguished chemist and philosopher, Dr. Wm. A. Miller. Half a century ago Fraunhofer recognized several of the solar lines in the light of the moon, Venus, and Mars, and also in the spectra of several stars. Recently, Donati, Janssen, Secchi, Rutherford, and the Astronomer Royal have observed lines in the spectra of some stars. Before I describe the results of our observations, I will state, in a few words, the principles of spectrum analysis upon which our interpretation of the phenomena we have observed has been based, and also the method of observing which we have employed.

When light which has emanated from different sources is decomposed by a prism, the spectra which are obtained may differ in several important respects from each other. All the spectra which may present themselves can be conveniently arranged in three general groups. A *spectrum* illustrating each of these three orders is placed upon the diagram:

1. The special character which distinguishes spectra of the *first order* consists in that the continuity of the colored band is unbroken either by dark or bright lines. By means of the electric lamp, Mr. Ladd will throw a spectrum of this order upon the screen. We learn from such a spectrum that the light has been emitted by an opaque body, and almost certainly by matter in the solid or liquid state. A spectrum of this order gives to us no knowledge of the chemical nature of the incandescent body from which light comes. In the present case the light is emitted by the white-hot carbon points of the electric lamp. A spectrum in all respects similar would be formed by the light from incandescent iron, or lime, or magnesia.

2. Spectra of the *second order* are very different. These consist of colored lines of light separated from each other. From such a spectrum we may learn much. It informs us that the luminous matter from which the light has come is in the *state of gas*. It is only when a luminous body is free from the molecular trammels of solidity and liquidity that it can exhibit its own peculiar power of radiating some colored rays alone. Hence substances, *when in a state of gas*,

may be distinguished from each other by their spectra. Each element, and every compound body that can become luminous in the gaseous state without suffering decomposition, is distinguished by a group of lines peculiar to itself. These green lines are produced by silver in a state of gas, and only by silver gas. It is obvious that if the groups of lines characterizing the different terrestrial substances be known, a comparison of these as standard spectra with the spectrum of light from an unknown source will show whether any of these terrestrial substances exist in the source of the light.

3. The *third order* consists of the spectra of incandescent solid or liquid bodies, in which the continuity of the colored light is broken by dark lines. These dark spaces are not produced by the source of the light. They tell us of vapors through which the light has passed on its way, and which have robbed the light, by absorption, of certain definite colors or rates of vibration; such spectra are formed by the light of the sun and stars.

Kirchhoff has shown that if vapors of terrestrial substances come between the eye and an incandescent body, they cause groups of dark lines, and, further, that the *group of dark lines* produced by each vapor is identical in the number of the lines and in their position in the spectrum with the *group of bright lines* of which its light consists when the vapor is luminous.

Mr. Ladd will throw upon the screen the spectrum of incandescent carbon points which contain sodium. Observe in addition to the continuous spectrum of the incandescent carbon a bright yellow band, which indicates the presence of sodium. Now a piece of metallic sodium will be introduced into the lamp. The sodium will be vaporized by the heat, and will fill the lamp with its vapor. This vapor absorbs, quenches the light that it emits when luminous. There will thus be produced a black line exactly in the place where the bright yellow line was seen.

It is evident that Kirchhoff by this discovery has furnished us with the means of interpreting the dark lines of the solar spectrum. For this purpose it is necessary to compare the bright lines in the spectra of the light of terrestrial substances, when *in the state of gas*, with the dark lines in the solar spectrum. When a group of bright lines coincides with a similar group of dark lines, then we know that the terrestrial substance producing the bright lines is present in the atmosphere of the sun; for it is this substance, and this substance alone, which, by its own peculiar power of absorption, can produce that particular group of dark lines. In this way Kirchhoff discovered the presence of several terrestrial elements in the solar atmosphere.

METHODS OF OBSERVATION.

I now pass to the special methods of observation by which, in our investigations, we have applied these principles of spectrum analysis to the light of the heavenly bodies. I may here state that several circumstances unite to make these observations very difficult and very irksome. In our climate, on few only even of those nights in which the stars shine brilliantly to the naked eye, is the air sufficiently steady for these extremely delicate observations. Further, the light of the star is feeble. This difficulty has been met, in some measure, by the employment of a large telescope. The light of a star falling upon the surface of an object-glass of eight inches aperture is gathered up and concentrated at the focus into a minute and brilliant point of light.

Another inconvenience arises from the apparent movement of the stars, caused by the rotation of the earth, which carries the astronomer and his instruments with it. This movement was counteracted by a movement given by clockwork to the telescope in the opposite direction. In practice, however, it is not easy to retain the image of a star for any length of time exactly within the jaws of a slit only the 1-300th of an inch apart. By patient perseverance these difficul-

ties have been overcome, and satisfactory results obtained. We considered that the trustworthiness of our results must rest chiefly upon *direct and simultaneous comparison* of terrestrial spectra with those of celestial objects. For this purpose we contrived the apparatus which is represented in the diagram.

By this outer tube the instrument is adapted to the eye-end of the telescope, and is carried round with it by the clock motion. Within this outer tube a second tube slides, carrying a cylindrical lens. This lens is for the purpose of elongating the round point-like image of the star into a short line of light, which is made to fall exactly within the jaws of a nearly-closed slit. Behind the slit an achromatic lens (and at the distance of its own focal length) causes the pencils to emerge parallel. They then pass into two prisms of dense flint glass. The spectrum which results from the decomposition of the light by the prisms is viewed through a small achromatic telescope. This telescope is provided with a micrometer screw, by which the lines of the spectrum may be measured.

The light of the terrestrial substances which are to be compared with the stellar spectra is admitted into the instrument in the following manner :

Over one-half of the slit is fixed a small prism, which receives the light reflected into it by the movable mirror placed above the tube. The mirror faces a clamp of ebonite, provided with forceps to contain fragments of the metals employed. These metals are rendered luminous in the state of gas by the intense heat of the sparks from a powerful induction coil. The light from the spark reflected into the instrument by means of the mirror and the little prism passes on to the prisms in company with that from the star. In the small telescope the two spectra are viewed in juxtaposition, so that the coincidence and relative positions of the bright lines in the spectrum of the spark with dark lines in the spectrum of the star can be accurately determined.

MOON AND PLANETS.

I now pass to the results of our observations.

I refer in a few words only to the moon and planets. These objects, unlike the stars and *nubulæ*, are not original sources of light. Since they shine by reflecting the sun's light, their spectra resemble the solar spectrum, and the only indications in their spectra which may become sources of knowledge to us are confined to any modifications which the solar light may have suffered, either in the atmosphere of the planets or by reflection at their surfaces.

Moon.—On the moon the results of our observations have been negative. The spectra of the various parts of the moon's surface, when examined under different conditions of illumination, showed no indication of an atmosphere about the moon. I also watched the spectrum of a star as the dark edge of the moon advanced towards the star and then occulted it. No signs of a lunar atmosphere presented themselves.

Jupiter.—In the spectrum of Jupiter, lines are seen which indicate the existence of an absorptive atmosphere about this planet. In this diagram these lines are presented as they appeared when viewed simultaneously with the spectrum of the sky, which, at the time of observation, reflected the light of the setting sun. One strong band corresponds with some terrestrial atmospheric lines, and probably indicates the presence of vapors similar to those which are about the earth. Another band has no counterpart among the lines of absorption of our atmosphere, and tells us of some gas or vapor which does not exist in the earth's atmosphere.

Saturn.—The spectrum of Saturn is feeble, but lines similar to those which distinguish the spectrum of Jupiter were detected. These lines are less strongly marked in the ansæ of the rings, and show that the absorptive power of the atmosphere about the rings is less than that of the atmosphere which surrounds the ball. A distinguished foreigner present at the meeting, Janssen, has quite

recently found that several of the atmospheric lines in this part of the spectrum are produced by aqueous vapor. It appears to be very probable that aqueous vapor exists in the atmospheres of Jupiter and Saturn.

Mars.—On one occasion some remarkable groups of lines were seen in the more refrangible part of the spectrum of Mars. These may be connected with the source of the red color which distinguishes this planet.

Venus —Though the spectrum of Venus is brilliant, and the lines of Fraunhofer were well seen, no additional lines affording evidence of an atmosphere about Venus were detected. The absence of lines may be due to the circumstance that the light is probably reflected, not from the planetary surface, but from clouds at some elevation above it. The light which reaches us in this way by reflection from clouds would not have been exposed to the absorbent action of the lower and denser strata of the planet's atmosphere.

THE FIXED STARS.

The fixed stars, though immensely more remote and less conspicuous in brightness than the moon and planets, yet, because they *are original sources of light*, furnish us with fuller indications of their nature.

To each succeeding age the stars have been a beauty and a mystery. Not only children, but the most thoughtful of men, often repeat the sentiment expressed in the well-known lines—

“Twinkle, twinkle, pretty star;
How I wonder what you are.”

The telescope was appealed to in vain, for in the largest instruments the stars remain diskless—brilliant points merely.

The stars have indeed been represented as suns, each upholding a dependent family of planets. This opinion rested *upon a possible analogy alone*. It was not more than a speculation. We possessed no certain knowledge *from observation* of the true nature of those remote points of light. This long and earnestly-coveted information is at last furnished by spectrum analysis. We are now able to read in the light of each star some indications of its nature. Since I have not a magician's power to convert this theatre into an observatory, and so exhibit to you the spectra of the stars themselves, I have provided photographs of careful drawings. These photographs Mr. Ladd will exhibit upon the screen by means of the electric lamp. I will take first the spectra of two bright stars which we have examined with great care.

The upper one represents the spectrum of Aldebaran, and the other that of Betelgeux, the star marked *a* in the constellation of Orion.

The positions of all these dark lines, about 80 in each star, were determined by careful and repeated measures. These measured lines form but a small part of the numerous fine lines which may be seen in the spectra of these stars.

Beneath the spectrum of each star are represented the bright lines of the metals which have been compared with it. These terrestrial spectra appeared in the instrument as you now see them upon the screen, in *juxtaposition* with the spectrum of the star. By such an arrangement, it is possible to determine with great accuracy whether or not any of these bright lines actually coincide with any of the dark ones. For example:

This closely double line is characteristic of sodium. You see that it coincides, line for line, with a dark line similarly double in the star. The vapor of sodium is therefore present in the atmosphere of the star, and sodium forms one of the elements of the matter of this brilliant but remote star.

These three lines in the green are produced, so far as we know, by the luminous vapor of magnesium *alone*. These lines agree in position exactly line for

line with three dark stellar lines. The conclusion, therefore, appears well founded that another of the constituents of this star is magnesium.

Again, there are two strong lines peculiar to the element *hydrogen*; one line has its place in the red part of the spectrum, the other at the blue limit of the green. Both of these correspond to dark lines of absorption in the spectrum of the star. Hydrogen, therefore, is present in the star.

In a similar way, other elements, among them bismuth, antimony, tellurium, and mercury, have been shown to exist in the star.

Now, in reference to all those elements, the evidence does not rest upon the coincidence of *one* line, which would be worth but little, but upon the coincidence of a group of two, three, or four lines, occurring in different parts of the spectrum. Other corresponding lines are probably also present, but the faintness of the star's light limited our comparisons to the stronger lines of each element.

What elements do the numerous other lines in the star represent? Some of them are probably due to the vapors of other *terrestrial* elements, which we have not yet compared with these stars. But may not some of these lines be the signs of primary forms of matter unknown upon the earth? Elements new to us may here show themselves which form large and important series of compounds, and therefore give a special character to the physical conditions of these remote systems. In a similar manner the spectra of terrestrial substances have been compared with several other stars. The results are given in the diagrams. Five or six elements have been detected in Betelgeux. Ten other elements do not appear to have a place in the constitution of this star.

β Pegasi contains sodium, magnesium, and perhaps barium.

Sirius contains sodium, magnesium, iron, and hydrogen.

α Lyrae (Vega) contains sodium, magnesium, iron.

Pollux contains sodium, magnesium, iron.

About sixty other stars have been examined, all of which appear to have some elements in common with the sun and earth, but the selective grouping of the elements in each star is probably peculiar and unique.

A few stars, however, stand out from the rest, and appear to be characterized by a peculiarity of great significance. These stars are represented by Betelgeux and *β Pegasi*. The general grouping of the lines of absorption in these stars is peculiar, but the remarkable and exceptional feature of their spectra is the absence of the two lines which indicate hydrogen, one line in the red and the other in the green. These lines correspond to Fraunhofer's C and F. The absence of these lines in some stars shows that the lines C and F are not due to the aqueous vapor of the atmosphere.

We hardly venture to suggest that the planets which may surround these suns probably resemble them in not possessing the important element hydrogen. To what forms of life could such planets be adapted? Worlds without water! A power of imagination like that possessed by Dante would be needed to people such planets with living creatures.

It is worthy of consideration that, with these few exceptions, the terrestrial elements which appear most widely diffused through the host of stars are precisely some of those which are essential to life such as it exists upon the earth, namely: hydrogen, sodium, magnesium, and iron. Besides, hydrogen, sodium, and magnesium represent the ocean, which is an essential part of a world constituted like the earth.

We learn from these observations that *in plan of structure* the stars, or at least the brightest of them, resemble the sun. Their light, like that of the sun, emanates from intensely white-hot matter, and passes through an atmosphere of absorbent vapors. With this unity of general plan of structure, there exists a great diversity among the individual stars. Star differs from star in chemical constitution. May we not believe that the individual peculiarities of each star

are essentially connected with the special purpose which it subserves, and with the living beings which may inhabit the planetary worlds by which it may possibly be surrounded?

When we had obtained this new information respecting the *true nature* of the stars, our attention was directed to the phenomena which specially distinguish some of the stars.

COLORS OF THE STARS.

When the air is clear, especially in southern climes, the twinkling stars do not all resemble diamonds; here and there may be seen in beauteous contrast *richly-colored gems*.

The color of the light of the stars which are bright to the naked eye is always some tint of *red, orange, or yellow*. When, however, a telescope is employed, in close companionship with many of these ruddy and orange stars, other fainter stars become visible, the color of which may be *blue, or green, or purple*.

Now it appeared to us to be probable that the origin of these differences of color among the stars may be indicated by their spectra.

Since we had found that the source of the light of the stars is incandescent solid or liquid matter, it appeared to be very probable that at the time of its emission the light of all the stars is white alike. The colors observed among them must then be caused by some modification suffered by the light after its emission.

Again, it was obvious that if the dark lines of absorption were more numerous or stronger in some part of the spectrum, then those colors would be subdued in power, relatively to the color in which few lines only occur. These latter colors remaining strong, would predominate, and give to the light, originally white, their own tints. These suppositions have been confirmed by observations.

Mr. Ladd will throw upon the screen the spectrum of Sirius, which may be taken as an illustration of the *stars the light of which is white*.

As might be expected, the spectra of these stars are remarkable for their freedom from strong groups of absorption lines. The dark lines, though present in great number, are all, with one exception, very thin and faint, and too feeble to modify the original whiteness of the light. The *one* exception consists of three very strong single lines: one line corresponding to Fraunhofer's C, one to F, and the other near G. Two of these certainly indicate the presence of hydrogen. This peculiarity, which seems invariably connected with colorless stars, is very suggestive, and invites speculation. May it be a sign of a temperature of extreme fierceness?

Let us now examine the spectrum of an *orange star*.

This diagram represents the spectrum of the brighter of the two stars which form the double star *α Herculis*. In the spectrum of this star the green and blue parts of the light, and also the deep red, are subdued with strong groups of lines, while the orange and yellow rays preserve nearly their original intensity, and therefore predominate in the star's light.

The question yet remained to be answered, would the faint telescopic stars, which are *blue, green, and purple*, and which are never found alone in the heavens, but always under the protection of a strong *ruddy* or *orange* star, furnish spectra in accordance with this theory?

With some little difficulty, and by means of a special arrangement of the spectrum apparatus, we succeeded in observing the spectra of the components of some double stars. There will now be thrown upon the screen the well-known double star β Cygni. In a large telescope the colors of the two stars are beautifully contrasted, as they now appear upon the screen. The spectra of these stars are now shown. The upper spectrum represents the orange star, the lower one that of its beautiful blue but feeble companion. In the orange star you observe that the dark lines are strongest and most closely grouped in the blue

and violet parts of the spectrum, and the orange rays therefore, which are comparatively free from lines, predominate.

In the delicate blue companion, the strongest groups of lines are found in the yellow, orange, and in part of the red. In the arrangement of these groups of lines we have a sufficient cause for the predominance of the other portions of the spectrum which unite in the eye to give the blue purple color of the light of this star.

We have, therefore, shown that the colors of the stars are produced by the vapors existing in their atmosphere. The chemical constitution of a star's atmosphere will depend upon the elements existing in the star and upon its temperature.

VARIABLE STARS.

The brightness of many of the stars is found to be variable. From night to night, from month to month, or from season to season, their light may be observed to be continually changing, at one time increasing, at another time diminishing. The careful study of these variable stars by numerous observers has shown that their continual changes do not take place in an uncertain or irregular manner. The greater part of these remarkable objects wax and wane in accordance with a fixed law of periodic variations which is peculiar to each.

We have been seeking for some time to throw light upon this strange phenomenon by means of observation of their spectra. If in any case the periodic variation of brightness is associated with *physical changes* occurring in the star, we might obtain some information by means of the prism. Again, if the diminution in brightness of a star should be caused by the interposition of a dark body, then, in that case, if the dark body be surrounded with an atmosphere, its presence might possibly be revealed to us by the appearance of additional lines of absorption in the spectrum of the star when at its minimum. One such change in the spectrum of a variable star we believe we have already observed.

Betelgeux is a star of a moderate degree of variability. When this star was at its maximum brilliancy in February last, we missed a group of lines, the exact position of which we had determined with great accuracy by micrometric measurement some two years before.

We have observed the spectra of several variable stars at different phases of their periodic variation, but our results are not yet complete.

It is worthy of notice that the variable stars which have a ruddy or an orange tint possess spectra analogous to that of Betelgeux and β Pegasi.

As an example of this group of variable stars, Mr. Ladd will throw upon the screen the spectrum of μ Cephei when at its maximum.

TEMPORARY STARS.

With the variable stars modern opinion would associate the remarkable phenomena of the so-called *new stars* which occasionally, but at long intervals, have suddenly appeared in the sky. But in no case has a permanently bright star been added to the heavens. The splendor of all these objects was temporary only, though whether they died out or still exist as extremely faint stars is uncertain. In case of the two modern temporary stars, that seen by Mr. Hind in 1845, and the bright star recently observed in Corona, though they have lost their ephemeral glory, they still continue as stars of the tenth and eleventh magnitudes.

The old theories respecting these strange objects must be rejected. We cannot believe with Tycho Brahe that objects so ephemeral are *new creations*, nor with Riccioli that they are stars brilliant on one side only, which have been suddenly turned round by the Deity. The theory that they have suddenly darted towards us with a velocity greater than that of light, from a region of remote invisibility, will not now find supporters.

On the 12th of May last a star of the second magnitude suddenly burst forth in the constellation of the Northern Crown. Thanks to the kindness of the discoverer of this phenomenon, Mr. Birmingham, of Tuam, I was enabled, conjointly with Dr. Miller, to examine the spectrum of this star on the 16th May, when it had not fallen much below the third magnitude.

I ought to state that Mr. Barker, of London, Canada West, who announced an observation of this star on 14th May in the Canadian Free Press, now claims to have seen the star on May 4th, and states that it increased in brilliancy up to May 10th, when it was at its maximum.

The spectrum of this star consists of two distinct spectra. One of these is formed by these four bright lines. The other spectrum is analogous to the spectra of the sun and stars.

These two spectra represent two distinct sources of light. Each spectrum is formed by the decomposition of light which is independent of the light which gives birth to the other spectrum.

The continuous spectrum, crowded with groups of dark lines, shows that there exists a photosphere of incandescent solid or liquid matter. Further, that there is an atmosphere of cooler vapors, which give rise by absorption to the groups of dark lines.

So far the constitution of this object is analogous to that of the sun and stars; but in addition there is the second spectrum, which consists of bright lines. There is, therefore, a second and distinct source of light, and this must be, as the character of the spectrum shows, *luminous gas*. Now the position of the two principal of the bright lines of this spectrum informs us that one of the luminous gases is *hydrogen*. The great brightness of these lines shows that the luminous gas is hotter than the photosphere. These facts, taken in connection with the suddenness of the outburst of light in the star, and its immediate very rapid decline in brightness *from the second magnitude down to the eighth magnitude in twelve days*, suggested to us the startling speculation that *the star had become suddenly enrapt in the flames of burning hydrogen*. In consequence, it may be, of some great convulsion, enormous quantities of gas were set free. A large part of this gas consisted of hydrogen, which was burning about the star in combination with some other element. This flaming gas emitted the light represented by the spectrum of bright lines. The increased brightness of the spectrum of the other part of the star's light may show that this fierce gaseous conflagration had heated to a more vivid incandescence the solid matter of the photosphere. As the free hydrogen became exhausted the flames gradually abated, the photosphere became less vivid, and the star waned down to its former brightness.

We must not forget that light, though a swift messenger, requires time to pass from the star to us. The great physical convulsion which is new to us is already an event of the past with respect to the star itself. For years the star has existed under the new conditions which followed this fiery catastrophe.

NEBULÆ.

I pass now to objects of another order.

When the eye is aided by a telescope of even moderate power, a large number of faintly luminous patches and spots come forth from the darkness of the sky, which are in strong contrast with the brilliant but point-like images of the stars. A few of these objects may be easily discerned to consist of very faint stars closely aggregated together. Many of these strange objects remain, even in the largest telescopes, unresolved into stars, and resemble feebly shining clouds, or masses of phosphorescent haze. During the last 150 years, the intensely important question has been continually before the mind of astronomers, "What is the true nature of these faint, comet-like masses?"

The interest connected with an answer to this question has much increased since Sir William Herschel suggested that these objects are portions of the primordial material out of which the existing stars have been fashioned; and further, that in these objects we may study some of the stages through which the suns and planets pass in their development from luminous cloud.

The telescope has failed to give any certain information of the nature of the nebulae. It is true that each successive increase of aperture has resolved more of these objects into bright points, but at the same time other fainter nebulae have been brought into view, and fantastic wisps and diffused patches of light have been seen, which the mind almost refuses to believe can be due to the united glare of innumerable suns still more remote.

Spectrum analysis, if it could be successfully applied to objects so excessively faint, was obviously a method of investigation specially suitable for determining whether any essential physical distinction separates the nebulae from the stars.

I selected for the first attempt, in August, 1864, one of the class of small but comparatively bright nebulae. My surprise was very great on looking into the small telescope of the spectrum apparatus to perceive that there was no appearance of a band of colored light, such as a star would give, but in place of this there were three isolated *bright lines* only.

This observation was sufficient to solve the long agitated inquiry in reference to this object at least, and to show that it was not a *group of stars*, but a *true nebula*.

A spectrum of this character, so far as our knowledge at present extends, can be produced only by light which has emanated from matter in the *state of gas*. The light of this nebula, therefore, was not emitted from incandescent solid or liquid matter, as is the light of the sun and stars, but from *glowing or luminous gas*.

It was of importance to learn, if possible, from the *position* of these bright lines, the chemical nature of the gas or gases of which this nebula consists.

Measures taken by the micrometer of the most brilliant of the bright lines showed that this line occurs in the spectrum very nearly in the position of the brightest of the lines in the spectrum of nitrogen. The experiment was then made of comparing the spectrum of nitrogen directly with the bright lines of the nebula. I found that the brightest of the lines of the nebula *coincided* with the strongest of the group of lines which are peculiar to nitrogen. It may be, therefore, that the occurrence of this one line only indicates a form of matter more elementary than nitrogen, and which our analysis has not yet enabled us to detect.

In a similar manner the faintest of the lines was found to coincide with the green line of hydrogen.

The middle line of the three lines which form the spectrum of the nebula does not coincide with any strong line in the spectra of about thirty of the terrestrial elements. It is not far from the line of barium, but it does not coincide with it. Besides these bright lines, there was also an exceedingly faint continuous spectrum. The spectrum had no apparent breadth, and must, therefore, have been formed by a minute point of light. The position of this faint spectrum, which crossed the bright lines about the middle of their length, showed that the bright point producing it was situated about the centre of the nebula. Now this nebula possesses a minute but bright nucleus. We learn from this observation that the matter of the nucleus is almost certainly not in a state of gas, as is the material of the surrounding nebula. It consists of opaque matter, which may exist in the form of an incandescent fog of solid or liquid particles.

The new and unexpected results arrived at by the prismatic examination of this nebula showed the importance of examining as many as possible of these remarkable bodies. Would all the nebulae give similar spectra? Especially it was of importance to ascertain whether those nebulae which the telescope had

certainly resolved into a close aggregation of bright points would give a spectrum indicating gaseity.

The observation with the prism of these objects is extremely difficult, on account of their great faintness. Besides this, it is only when the sky is very clear and the moon is absent that the prismatic arrangement of their light is even possible. During the last two years I have examined the spectra of more than sixty nebulae and clusters. These may be divided into two great groups. One group consists of the nebulae which give a spectrum similar to the one I have already described, or else of one or two only of the three bright lines. Of the six objects examined, about one-third belong to the class of gaseous bodies. The light from the remaining forty nebulae and clusters becomes spread out by the prism into a spectrum which is *apparently* continuous.

I will exhibit upon the screen a few of the more remarkable of the nebulae *which are gaseous in their constitution*.

This photograph is from a drawing by Lord Rosse of a small nebula in Aquarius. (I. H. IV.)

We have here a gaseous system which reminds the observer of Saturn and his rings. The ring is seen edgeways.

The three bright lines represent the spectrum into which the light of this object is resolved by the prism.

In this other nebula we find probably an analogous general form of structure. In consequence of the nebula lying in a different position to us, its ring is seen, not edgeways, but open on the flat. The spectrum consists of three bright lines.

The arrangement of the streams of light in the object now on the screen suggests a spiral structure. This nebula is remarkable as the only one in which, in addition to the three bright lines, a fourth line was also seen.

The most remarkable, and possibly the nearest to our system, of the nebulae presenting a *ring formation*, is the well-known annular nebula in Lyra. The spectrum consists of one bright line only. When the slit of the instrument crosses the nebula, the line consists of two brighter portions, corresponding to the sections of the ring. A much fainter line joins them, which shows that the faint central portion of the nebula has a similar constitution.

A nebula remarkable for its large extent and peculiar form is that known as the *dumb-bell nebula*. The spectrum of this nebula consists of one line only. A prismatic examination of the light from different parts of this object shows that it is throughout of a similar constitution.

The most widely known, perhaps, of all the nebulae is the remarkable cloud-like object in the sword-handle of Orion.

This object is also gaseous. Its spectrum consists of three bright lines. Lord Rosse informs me that the bluish-green matter of the nebula has not been resolved by his telescope. In some parts, however, he sees a large number of very minute *red* stars, which, though apparently connected with the irresolvable matter of the nebula, are yet doubtless distinct from it. These stars would be too faint to furnish a visible spectrum.

I now pass to some examples of the other great group of nebulae and clusters.

All the true *clusters*, which are resolved by the telescope into distinct bright points, give a spectrum, which does not consist of separate bright lines, but is *apparently* continuous in its light. There are many *nebulae* which furnish a similar spectrum.

I take, as an example of these nebulae, the great nebula in Andromeda, which is visible to the naked eye, and is not seldom mistaken for a comet. The spectrum of this nebula, though apparently continuous, has some suggestive peculiarities. The whole of the red and part of the orange are wanting. Besides this character, the brighter parts of the spectrum have a very unequal and mottled appearance.

It is remarkable that the easily resolved cluster in Hercules has a spectrum precisely similar. The prismatic connection of this cluster with the nebula in Andromeda is confirmed by telescopic observation. Lord Rosse has discovered in this cluster dark streaks or lines similar to those which are seen in the nebula in Andromeda.

In connection with these observations, it was of great interest to ascertain whether the broad classification afforded by the prism of the nebulae and clusters would correspond with the indications of resolvability furnished by the telescope. Would it be found that all the *unresolved* nebulae are *gaseous*, and that those which give a *continuous spectrum* are *clusters of stars*?

Lord Oxmantown has examined all the observations of the sixty nebulae and clusters in my list, which have been made with the great reflecting telescope erected by his father the Earl of Rosse.

The results are given in this diagram:

	Continuous Spectrum.	Gaseous Spectrum.
Clusters	10	0
Resolved, or Resolved?	5	0
Resolvable, or resolvable?	10	6
Blue or green, no resolvability, no resolvability seen	{ 0 6	{ 4 5
	—	—
	31	15
Not observed by Lord Rosse	10	4
	—	—
	41	19
	==	==

Considering the great difficulty of successful telescopic observation of these objects the correspondence between the results of prismatic and telescopic observation may be regarded as close and suggestive.

Half of the nebulae which give a continuous spectrum have been resolved, and about one-third more are probably resolvable; while of the gaseous nebulae *none have been certainly resolved*, according to Lord Rosse.

The inquiry now presents itself upon us, what superstructure of interpretation have we a right to raise upon the new facts with which the prism has furnished us?

Is the existence of the gaseous nebulae an evidence of the reality of that primordial nebulous matter required by the theories of Sir William Herschel and Laplace.

Again, if we do not accept the view that these nebulae are composed of portions of the original elementary matter out of which suns and planets have been elaborated, what is the cosmical rank and relation which we ought to assign to them?

As aids to a *future* determination of these great questions I will refer in a few words to some other observations.

COMETS.

There are objects in the heavens which occasionally, and under some conditions, resemble closely some of the nebulae. In some positions in their orbits some of the comets appear as round vaporous masses, and, except by their motion, cannot be distinguished from nebulae. Does this occasional general resemblance indicate a similarity of nature? If such be the case, if the material of the comets is similar to that of the nebulae, then the study of the wonderful changes which comets undergo in the neighborhood of the sun may furnish useful information for a more correct interpretation of the structure and condition

of the nebulae. In 1864 Donati found that the spectrum of a comet visible in that year consisted of *bright lines*.

Last January a small telescopic comet was visible. Its appearance in a large telescope is represented on the screen. It was a nearly circular, very faint vaporous mass. Nearly in the centre, a small and rather dim nucleus was seen. When this object was viewed in the spectroscope, two spectra were distinguished. A very faint continuous spectrum of the coma showing that it was visible by reflecting solar light. About the middle of this faint spectrum a bright point was seen. This bright point is the spectrum of the nucleus, and shows that its light is different from that of the coma. This short bright line indicates that the nucleus of this comet was self-luminous, and further, the position of this line of the spectrum suggests that *the material of the comet was similar to the matter of which the gaseous nebulae consist*.

MEASURES OF THE INTRINSIC BRIGHTNESS OF THE NEBULÆ.

It appeared to me that some information of the nature of the nebulae might be obtained from observations of another order. If physical changes of the magnitude necessary for the conversion of the gaseous bodies into suns are now in progress in the nebulae, surely this process of development would be accompanied by marked changes in the intrinsic brightness of their light, and in their size.

Now since the spectroscope shows these bodies to be continuous masses of gas, it is possible to obtain an approximate measure of their *real brightness*. It is known that as long as a distant object remains of sensible size, its brightness remains unaltered. By a new photometric method, I found the *intrinsic* intensity of the light of three of the gaseous nebulae in terms of a sperm candle burning at the rate of 158 grains per hour :

Nebula No. 4,628, $\frac{1}{1508}$ part of the intensity of the candle.

Annular nebula, Lyra, $\frac{1}{6032}$ part of the intensity of the candle.

Dumb-bell nebula, $\frac{1}{19604}$ part of the intensity of the candle.

These numbers represent not the *apparent* brightness only, but the *true brightness* of these luminous masses, except so far as it may have been diminished by a possible power of extinction existing in cosmical space, and by the absorption of our atmosphere. It is obvious that similar observations, made at considerable intervals of time, may show whether the light of these objects is undergoing increase or diminution, or is subject to a periodic variation.

If the dumb-bell nebula, the feeble light of which is not more than one twenty-thousandth part of that of a candle, be in accordance with popular theory a *sun-germ*, then it is scarcely possible to put in an intelligible form the enormous number of times by which its light must increase before this faint nebula, feebler now in its glimmering than a rushlight, can rival the dazzling splendor of our sun.

MEASURES OF THE NEBULÆ.

Some of the nebulae are sufficiently defined in outline to admit of accurate measurement. By means of a series of micrometric observations, it may be possible to ascertain whether any considerable alteration in size takes place in nebulae.

METEORS.

Mr. Alexander Herschel has recently succeeded in subjecting another order of the heavenly bodies to prismatic analysis. He has obtained the spectrum of a bright meteor, and also the spectra of some of the trains which meteors leave behind them. A remarkable result of his observations appears to be that sodium, in the state of luminous vapor, is present in the trains of most meteors.

CONCLUSION.

In conclusion, the new knowledge that has been gained from these observations with the prism may be summed up as follows:

1. All the brighter stars, at least, have a structure analogous to that of the sun.
2. The stars contain material elements common to the sun and earth.
3. The colors of the stars have their origin in the chemical constitution of the atmospheres which surround them.
4. The changes in brightness of some of the variable stars are attended with changes in the lines of absorption of their spectra.
5. The phenomena of the star in Corona appear to show that in this object, at least, great physical changes are in operation.
6. There exist in the heavens *true nebulae*. These objects consist of luminous gas.
7. The material of comets is very similar to the matter of the gaseous nebulae, and may be identical with it.
8. The bright points of the star-clusters may not be in all cases stars of the same order as the separate bright stars.

It may be asked what cosmical theory of the origin and relations of the heavenly bodies do these new facts suggest? It would be easy to speculate, but it appears to me that it would not be philosophical to dogmatize at present on a subject of which we know so very little. Our views of the universe are undergoing important changes; let us wait for more facts, with minds unfettered by any dogmatic theory, and therefore free to receive the obvious teaching, whatever it may be, of new observations.

Star differs from star in glory, each nebula and each cluster has its own special features; doubtless in wisdom, and for high and important purposes, the Creator has made them all.

ON THE EXTERNAL APPEARANCE OF THE SUN'S DISK.

TRANSLATED FROM THE GERMAN PERIODICAL "AUS DER NATUR," ETC., LEIPZIG, No. 11—1864.

IN one of the last meetings of the Astronomical Society of England, some interesting remarks on the aspect presented by the exterior envelope of the sun were offered by M. Dawes. He first adverted to the great increase in the number of the observers who apply themselves to the study of that orb. since the number of large telescopes had itself so greatly increased and the dangers incident to the sight been correspondingly diminished. But the appearances in the sun, when carefully studied with these powerful instruments and under favorable atmospherical circumstances, differ so widely from those which had been observed with the imperfect instruments of former times, that it can occasion no surprise if some observers, unapprised of what has been already noticed, should take the objects which fall within the field of their telescope to be new discoveries. That this is sometimes the case, there is every reason to believe. Not this circumstance alone, but still more the new names invented for these supposed discoveries, tend certainly more to impede than to promote the advancement of science. It would seem desirable, therefore, that attention should be directed to those appearances which have been long since observed and described, and that they should be collected and compared with the facts which have been more recently verified by the help of the improved telescope.

To recognize the spotted appearance of the sun, no very great enlargement is necessary. M. Dawes has often observed it with a refractor of only $2\frac{1}{2}$ inches opening, and a magnifying power of 60. If the surface of the sun be observed with an instrument of from six to eight inches opening, it presents the appearance of being chiefly composed of luminous masses which are separated from one another by rows of small black points. The interval between these points is but feebly brought out, and is filled with a matter which shines less brightly than the general surface. Whatever the magnifying power employed, the division between the luminous masses seems never to be complete.

These masses present almost all possible varieties of irregular forms. The rarest of all are those which Nasmyth has compared to willow leaves. They are long, slender, and pointed. This form is only observed in the immediate neighborhood of the larger spots, in their half-shade, and their shadows extending but a small distance from them—a peculiarity mentioned by Dawes as early as 1852, in his description of a new telescope, wherein he also states that the under side of the half-shades appears thickly indented, that lustrous points seem to be directed to the centre of the spots, and that they present, on the whole, the appearance of a band woven of straw whose inner ends have not been brought into close conformity.

Sir John Herschel has stated, in his Introduction to Astronomy, that the part of the sun's disk which is free from spots, shines with no uniform lustre; that the surface of the sun appears dotted with small black points or pores, which, when attentively observed, appear to be undergoing constant change, and that nothing can be more fitly compared with this appearance than the slow subsidence of the flakes of a chemical precipitation in a transparent liquid when looked at from above. M. Dawes has observed and confirms this phenomenon, though

he throws some doubt upon the circumstance of a continual change in the state of these pores. He says that he has explored and considered the surface of the sun with the greatest care, reducing the diaphragm of his telescope to small openings of from 20 to 60" diameter, and availing himself of a greater degree of enlargement than is generally to be commanded; that he has frequently retained the same shining masses, with the included pores, under observation for not less than two hours, but has seldom at any time observed a change, even with a magnifying power of 4,600 fold. He adds that the disturbances which so often take place in the atmosphere are sufficient to produce the belief that a constant change is going on in the objects we observe, and that the eye, when confined to so narrow a field, soon grows weary, and the vision becomes embarrassed.

To this comparative repose, however, there is one fact which forms an exception, for when our observation is directed to the immediate neighborhood of the spots, these are found to enlarge or diminish with great rapidity. It is chiefly under these circumstances that the lustrous masses assume the lengthened shape before spoken of; but these changes are the most vivid when these bright masses extend themselves by a rapid movement across the abyss, and thus form those dazzling bridges which often proceed from the principal spots. The point from which such a movement proceeds is frequently indicated by an accumulation and bending of the greater axis of one of the lengthened masses in the direction of the movement. Here M. Dawes shares the opinion of Sir John Herschel respecting the appearance of chemical precipitation, and refers to it the cause of these phenomena.

Wherever this appearance occurred, M. Dawes narrowed his observation to the edge of the spots, and embracing but a small field, examined with attention the formation of the first part of the bridge. The bright masses presented the appearance of haums of straw, lying nearly all in the same direction and but few oblique to the line of the bridge, the sides of which seemed notched, on account of the unequal length of the parts of which it was formed. It may be remarked that these bridges are always constituted by bright stripes or lines which proceed from the outer envelope and are projected to the half-shadows, without mingling with the under and less brilliant strata. M. Dawes at least has never found it otherwise. The light of these stripes has always been of such intensity that the lines formed by the bridges, however narrow, rendered it impossible to distinguish with the eye the spot from the shadow.

As regards investigations respecting the origin or cause of the sun-spots, M. Dawes advises observers to direct particular attention to the dark nucleus which presents itself in the shadow of the most symmetrical spots. For twelve years has he been made sensible of the inconvenience arising from the application of the same name to different objects and the failure to distinguish the shadow from the nucleus. This admonition has unfortunately been little heeded; in the description of the spots the shadow is constantly confounded with the true nucleus. M. Dawes the more insists upon this point, because his own observations have satisfied him that the presence or absence of the nucleus is competent to determine the origin of the spots, or at least to throw a strong light upon the question, and that the origin of the spots in which the nucleus occurs is altogether different from that where no such phenomenon appears.

To avoid all confusion it is of course indispensable to denominate each several thing by its true name. From the diligent observation of Dawes it results that the shadow under the half-shadow is not the sun's nucleus, and that this nucleus sometimes appears in the centre of the shadow. These two essentially different facts should never be lost sight of.

ON ACCIDENTAL OR SUBJECTIVE COLORS.

PERSISTENCE OF IMAGES.—CONTRAST.—IRRADIATION.—DALTONISM, ETC.

BY THE ABBÉ MOIGNO.

Translated for the Smithsonian Institution from the author's "*Repertoire d'optique moderne ou Analyse complet des travaux modernes relatif aux phénomènes de la lumière.*"

IN order to distinguish clearly between purely objective and subjective colors, of the latter of which it is here proposed to treat, the following *definitions* should be premised. *Objective* colors are those in regard to which the eye is simply an organ of vision, an instrument rather passive than active, perceiving merely an external phenomenon without contributing in any manner to its production. The colors of the solar spectrum, those produced by refraction, those by which bodies manifest themselves to us, &c., are objective colors. *Subjective* colors are those which are produced, at least in part, by the eye itself, by a certain reaction of the organ of vision under the influence of a first sensation. If, for example, having closely observed in a strong light the yellow covering of a pamphlet, we open it rapidly, the white pages seem overspread with blue light: now, this blue light is evidently nothing real, is no objective color, but a phenomenon undoubtedly produced in the eye itself—a subjective phenomenon. These latter colors have hence been called *accidental* and *physiological*. The first term appears to us to be preferable, and we shall usually adopt it in the analysis which we are about to present of the researches relating to this class of luminous phenomena.

Reaction of the eye.—In order, first, to give as clear an idea of this remarkable property which the eye possesses of reacting under the impression of a light more or less vivid, and of becoming in some degree active instead of passive, as it previously had been, we shall cite a portion of the letter addressed to Locke by the great Newton, on the images occasioned in the eye by the action of the solar light: "I have made on myself, and at the peril of my sight, the experiment which you mention, and which occurs in Mr. Boyle's book on colors. I practiced it in the following manner: Having looked with the right eye, for a very short time, at the image of the sun reflected from a mirror, I then turned my eye towards an obscure corner of the apartment, and closing the eyelid observed the impression which resulted—that is to say, the colored circle which surrounded the image of the sun, and which, growing weaker by degrees, finally disappeared. I repeated this act a second and third time. At the third repetition, when the luminous image and the colors which surrounded it were rapidly disappearing, and while my attention was concentrated in the expectation that I should completely lose sight of them, I saw them, with no little surprise, again make their appearance and gradually become as vivid and strong as they had been at the moment when I ceased contemplating the sun. * * * I was obliged, in order to recover the use of my eyes, to confine myself in a darkened apartment for three whole days, nor did I perfectly recover my sight but by wholly abstaining from the view of all brilliant objects."

This fact and a thousand others abundantly prove that when the portion of the retina, excited by the presence of a luminous object, is suddenly withdrawn from that action, the impression produced by the object does not immediately

cease, but persists during a very sensible interval of time. Let us pause for a few instants to consider with M. Plateau this capital phenomenon, on which depend, in part at least, the subjective colors.

Persistence of images.—Every one knows that when a burning coal is rapidly whirled in the dark, a luminous curve will be seen, as if the coal left on the eye the trace of its passage. This appearance evidently results from the fact that the impression produced by the object at any point of its course still subsists for some time after it has left that point, so that the successive positions of the luminous object must appear simultaneous. To the same cause are to be referred numerous appearances which exhibit themselves whenever we observe an animated object in rapid motion. To this fireworks owe a part of their brilliant effect; rain and hail, for this reason, instead of presenting in their fall the appearance of rounded bodies, offer that of parallel lines; the teeth of a wheel which turns rapidly disappear and seem to be replaced by a semitransparent gauze, through which objects may be distinguished; a vibrating cord presents an analogous effect, &c. We may also directly observe the phenomenon of the persistence of impressions if, after having looked at a luminous object of sufficient lustre, a window for instance, we suddenly close and cover the eyes, when the image of the object will be seen to continue for some time.

Measure of the duration of impressions.—Although this persistence of impressions is constantly reproduced and under a multitude of circumstances, and has received many useful and curious applications, it has been very little studied. D'Arcy first conceived the idea of measuring the duration of the phenomenon by causing a burning coal to revolve in darkness so as to produce the appearance of a luminous ring. And if, in effect, we succeed in giving to the object such a velocity that it shall repass at each point of its course, precisely at the instant when the impression produced by its passage is at the point of vanishing, the duration of the impression will be measured by that of a revolution. D'Arcy concluded from his experiments that the duration of the impression produced on his eye by a burning coal was equal to $8'''$ or $0''.13$. But this method is defective; it gives not the complete duration of the impression, but only the time during which this impression is maintained without sensible loss. To obtain with exactness the total duration of the impression it would be necessary that the velocity of the object should be such that it shall find at each point in its course the preceding impression so much weakened as to be just at the point of extinction; which is almost impossible. M. Plateau has, however, succeeded in surmounting, in part, these difficulties, and has determined the total duration of the impressions produced on his eye by white, yellow, red, or blue objects, observed by daylight. The values for the different colors employed are perceptibly equal: their mean is $0''.34$, instead of $0''.13$ found by D'Arcy; still this result is but a first approximation.

Length of time necessary for the production of the impression.—Experiments of this kind plainly establish the existence of another fact too little remarked: namely, that for the complete formation of an impression on the retina some lapse of time is requisite. This might have been inferred from the well-known fact that an object which passes very rapidly before the eye is scarcely distinguishable, or even is not perceived at all. The following experiment places this beyond doubt: Let a small white object, a piece of paper for instance, be made to move circularly before a dark back-ground with such a velocity that the apparent ring shall present a tint perfectly uniform and constant; this ring will not appear white, but gray. Now, it is apparent from the uniformity of the tint that, during the duration of a revolution, the impression produced is maintained without sensible loss; if this impression were white, it is evident that the entire ring ought to appear decidedly white, not gray; it follows that by reason of the small space of time during which the object acts on each point of the retina, it produces only a grayish impression—that is to say, an impression imperfectly white. No

attempt has been made to measure the time necessary for the complete production of the impression. As regards the time during which a given impression preserves an intensity perceptibly constant, M. Plateau has arrived at the following conclusions :

Laws of the persistence of images.—First. The interval of time during which an impression is maintained without sensible loss is proportionably greater as the impression is less intense. Second. This interval, for the production of a complete impression on the eye of M. Plateau by a white paper, in broad daylight, was found to be less than 0".008 ; for yellow paper, a little longer than white ; still longer for red, and longer still for blue. These limits may be much exceeded when the impressions have little intensity. It will be seen that, according to these results, it cannot be said in general, as in speaking of the particular case of a burning coal, that, in order to obtain a continuous sensation, it suffices that the luminous impression be repeated eight or ten times per second. In order to produce on the eye of M. Plateau the continuous sensation of whiteness, such as that of a piece of paper in the full light of day, it was necessary, from the number above given, that the impression of light should be repeated more than 125 times per second. Third. The total duration of the impression appears to be greater in proportion as the impression is more intense. When the object which has produced the impression is very luminous, such as the setting sun, and we cover the eyes, the impression sometimes subsists for several minutes. In some persons, the imagination may exert great influence over phenomena of this sort. Fourth. The total duration of the impression appears to be greater in proportion as the object has been observed for a shorter time ; provided, however, that the time be sufficient to develop a complete impression. When, for example, M. Plateau cast his eyes on a small isolated window and speedily directed them to an obscure part of the chamber, he saw the image with its luminous panes and dark sashes distinctly persist, though growing fainter, for about three seconds. If he looked at the window a little longer, the duration of the image was less ; and, finally, after a prolonged observation of the window, the image was so fugitive that he could with difficulty perceive a trace of it. Fifth. When the impression proceeds from a very luminous object, such as the setting sun, or even a window, it usually passes through a series of different colors. Thus, when, after having looked at a window for a very short time, M. Plateau covered his eyes with a handkerchief, he saw the image of the luminous panes become successively red, violet, blue, again violet, whitish, then greenish, and green. These phenomena, which seem to vary much with the circumstances of the experiment, have received as yet no satisfactory explanation. Sixth. When, lastly, the impression persisting on the retina proceeds from a brilliant object, it is observed occasionally to disappear and reappear several times in succession before it completely vanishes. This, for example, takes place, according to Darwin, when the setting sun has been observed for some instants, so as not too much to fatigue the sight, and the observer afterwards, with the eyes closed and covered, considers the persistence of the impression produced.

Kaleidophone.—Mr. Wheatstone has made use of the persistence of these impressions to exhibit to the eye the mode in which the transverse vibrations of an elastic rod attached by one of its extremities take place. For this purpose, the rod is terminated by a small and polished metallic ball, or by a small hollow sphere of glass, plated on the interior, and the apparatus is exposed to the sun or the light of a candle. When the rod is put in vibration by means of a bow, or by removing it from its position of equilibrium and then leaving it to itself, the brilliant point which the sun or candle occasions on the little ball produces, by its rapid movement, the appearance of beautiful curves, more or less complicated, according to the form of the rod and the sound which it has been made to produce ; thus each system of vibration and each sound has its image. To this ingenious apparatus Mr. Wheatstone has given the name of *kaleidophone*.

Photometer of Mr. Wheatstone.—Another instrument of this distinguished English savant, founded on the same principle, and called a *photometer*, produces still more singular appearances. It consists in causing to revolve eccentrically a disk of cork, having attached to it a greater or less number of little balls similar to those just spoken of, and arranged under the form of regular or irregular polygons. Each of these balls, illuminated by a ray, gives rise in its rotation to a curve, and the different curves, by their involutions, describe the most curious figures.

Different chronoscopes.—*Means of appreciating the instantaneousness or duration of various phenomena*—Mr. Wheatstone has also devised some very curious processes, founded in like manner on the persistence of impressions, which have enabled him to prove the instantaneousness of certain luminous phenomena, such as the electric spark, or to estimate their duration, however short. One of them consists in observing the phenomenon by reflection in a mirror, to which a very rapid movement is given of such a nature that supposing the luminous object to be persistent, its image seems to describe a great circle. Now, if the phenomenon be instantaneous, the image can be seen only in a single point of this circle, and will not appear changed in form; if, on the contrary, the phenomenon has an appreciable duration, the image will be elongated in such a manner as to form an arc of a length proportioned to the duration, so that from the magnitude of the perceived arc the duration of the luminous phenomenon may be calculated. An electric spark observed in this manner does not appear at all elongated, whence it must be regarded as instantaneous. Mr. Wheatstone has, in this way, rendered perceptible the intermission of certain flames or luminous jets which, to the naked eye, seem perfectly continuous, such as a current of electric sparks received at a very small distance from a conductor. The light being thus, in an extremely small interval of time, stretched along a greatly extended line, the slightest discontinuity becomes visible, and it is for this reason that the current of sparks presents under such circumstances the aspect of a series of luminous points separated by dark spaces.

Again, Mr. Wheatstone has demonstrated, in the following manner, the instantaneousness of the electric spark: A disk of white pasteboard, on which is drawn in black any figure whatever, is made to turn with great rapidity in its own plane around a fixed axis. From the movement of rotation it becomes impossible any longer to distinguish the figure traced on the circle, which now presents only a series of concentric bands of different tints. This is an evident result of the persistence of impressions. Now let the circle be put in motion in a chamber perfectly darkened, and be then suddenly illuminated by an electric spark, immediately the figure will be very distinctly perceived, as if it were in a state of complete immobility, no matter what velocity may be given to the circle. But this effect could not take place if the spark had a sensible duration, for then the figure would be seen in several successive positions, and thence a confusion would result, so much the greater as the duration of the spark was more prolonged. Mr. Wheatstone has further availed himself of this process to destroy, in certain cases, the false appearances which the persistence of impressions gives to objects in rapid motion. These objects being illuminated by this means, but for an exceedingly short time, they exhibit themselves only in a single position, and the impression which they produce having a sensible duration, we are enabled to judge of their true form. It is thus that Mr. Wheatstone has succeeded in seeing very distinctly with the microscope the movable wheels of the infusory animal called the *rotifer*. The foregoing processes will be found described at length in our treatise on electric telegraphy, as well as the uses to which MM. Arago, Wheatstone, and Dové have applied the same principles, in order to make manifest the duration of flashes of light, the discontinuity of their illumination, the velocity of electricity, the unequal velocity of light in different refracting mediums, &c.

Other processes for manifesting the continuity or discontinuity of various phenomena.—Savart, in a particular case, made use of a process which in like manner enabled him to rectify false appearances resulting from rapid movement, and to determine the real figure of a liquid vein flowing from a circular orifice pierced in a thin plate. His apparatus consists essentially of a large riband, whose surface is divided by transverse bands alternately white and black, and to which a rapid movement may be given in the direction of its length. The liquid being supposed to flow vertically, the movable riband is placed behind the vein, and in a position parallel to it. If a movement sufficiently rapid be then communicated to the apparatus, the eye, placed before the system, can distinguish the several peculiarities presented by the vein; such as the annular dilatations which are propagated along the portions of the vein contiguous to the orifice; a portion which, without the aid of this instrument, appears as smooth as a stem of crystal. The effect produced by this apparatus is analogous to those produced by two wheels turning with rapidity, one behind the other, in planes parallel and approximated, and with unequal velocities of speed or direction.

M. Matteucci has remarked quite recently that, in order to confirm the ingenious observations of Savart, on the constitution of the liquid vein, it is only requisite to illuminate the vein with a large electric spark, or rather a series of sparks. On examining in this manner the fluid vein, obtained as Savart prescribes, it will be easily seen that the part which, to the eye, appears continuous, is in reality composed of drops having exactly the form assigned to them by the illustrious physicist, some being elongated, others flattened, others almost spherical.

M. Plateau has proposed a general process different from that of Mr. Wheatstone, to show under their real form the objects to which their rapid movement gives a deceptive appearance. His apparatus consists of a disk of blackened pasteboard, of about twenty-five centimetres in diameter, movable around an axis like a wheel, and perforated towards its circumference with some twenty narrow slits in the direction of the radii. These openings should be about two millimetres in breadth, and two centimetres in length, and situated at equal distances from one another. To make use of this instrument, it is necessary to give to the disk a movement of rotation sufficiently rapid, then closing one eye, to observe with the other, through the transparent circular band which results from the revolution of the slits, the movable object of which we wish to ascertain the true form; the eye, at the same time, must be held as near as possible to the openings, and the observer be at a certain distance from the object.

Let us suppose, in the first place, that the object has a periodical movement; that is to say, that it passes successively through the same positions; that, for example, it is a chord in vibration, a burning coal moved circularly, &c.; or that such objects as the radii or teeth of a wheel, &c., occupy in succession the same place; then, if the velocity of our disk be such that whenever an opening passes before the eye the same object or similar objects recur in the same position, there will obviously be formed on the retina a succession of identical impressions, which their persistence will connect with one another; hence will result the continuous appearance of an object or series of immovable objects, having the real form, or very nearly such, of the objects we are observing. Thus, for instance, a wheel which turns so rapidly that its radii or teeth appear confounded, would seem perfectly motionless through our disk, supposing the latter to have a suitable velocity. Even if the movement of the object do not present a regular succession, as in the case of one of those luminous meteors whose brilliant trace is probably due to the persistence of the impression, the instrument will still be useful. In that case the object cannot be isolated, as regards the eye, in a succession of identical positions; but the images which it produces on the retina, in the different positions which correspond to the passage of the successive openings, will persist sufficiently long to enable us to judge in general of its real form.

In illustration, we will refer to the effect which is presented, under certain

circumstances, by the flame of a candle subjected to this mode of observation. We know that such a flame seems, from time to time, to undergo a rapid oscillatory movement in the direction of its length; its summit appears to rise and sink alternately. If, at the moment of such agitation, this flame be observed by means of the disk in question, the upper part will be seen to be divided into several distinct portions, situated some above the others, and separated by dark intervals. From this it must be inferred that the apparent oscillatory movement of the flame is occasioned by the detachment from its summit of a succession of partial and separate flames which rise rapidly, and are extinguished one after the other.

Thaumatrope.—The phenomenon which we have been considering is the principle of many curious illusions. Every one is acquainted with the little instrument called a *thaumatrope*, which consists of a circular piece of pasteboard made to move rapidly around one of its diameters, and which bears on each of its faces figures drawn in such a way that the combination of the two impressions they produce on the retina forms a third and regular picture.

Anorthoscope.—M. Plateau has made use of the persistence of impressions to produce a new sort of anamorphosis by causing two disks to turn rapidly, one behind the other, with velocities relatively determinate, the disk in the rear bearing a distorted figure brightly illuminated, and that in front being perforated with a narrow opening. He has shown that from the most deformed figures may thus be produced regular images which seem perfectly motionless. The regular figures thus generated result from the successive apparent intersections of the opening with different parts of the deformed figure; intersections which the persistence of impressions causes to appear simultaneous. This application has given rise to a curious apparatus, known by the name of *anorthoscope*.

Experiments of Mr. Faraday.—Mr. Faraday has published a note on certain illusions resulting principally from the regular appearances presented by two wheels of the same size and with the same number of radii, placed one behind the other, and turning rapidly on a common axis in planes very close to one another, with equal velocities and in contrary directions. The eye, placed in front of such a system in the direction of the axis, will see the appearance of a wheel perfectly motionless, and whose radii will be double in number to those of each of the two wheels in motion.

Another experiment by Mr. Faraday consists in causing to turn, in front of a mirror and four to five metres distant from it, a dentated wheel of pasteboard, and observing in the glass the image of this wheel through the seemingly gauzy medium produced by the movement of the teeth and their intervals, the eye being placed very near the wheel. The image then appears completely motionless and in its real form, as if the movement of the wheel had ceased. Mr. Faraday has further shown that, if the part of the wheel comprised between the teeth and the centre be divided into sectors colored and suitably arranged, the colors, which become confused when the revolving wheel is looked at directly, are immediately separated if its image in the mirror be observed in the manner above indicated. It would be easy to deduce from the principles which we have already established the reason of the effects just described. In the same manner may be explained the following experiment, due also to Mr. Faraday: If a new range of openings be cut in the wheel between the teeth and the centre, the number of which differs a little from that of the teeth, and this wheel be then subjected to the experiment of the mirror, on looking through one or another range of openings, the image of that through which we look appears to undergo a slow movement of rotation. Several rows of openings may be thus pierced so as to produce the appearance of movements more or less rapid and of different directions.

Phantascope, phenakistoscope.—The experiments which we have been recounting have led M. Plateau to realize a new species of illusions, which con-

sists in causing figures delineated on a disk to appear animated and alive. The instrument with which this is effected is called a *phantascope*, and produces appearances truly singular. The same idea, since carried into execution in a much more imperfect manner, has given rise to the *phenakistoscope*. The latter apparatus consists essentially of a disk of pasteboard perforated towards the circumference with a series of narrow openings; on the disk are painted small figures which, when it is made to revolve opposite a mirror, seem, when the image is observed through the openings, to become animated and to execute different movements. The effect proceeds from such an arrangement of the instrument that figures which differ progressively from one another in form, position, or place, present themselves in quick succession to the eye, so that, the persistence of the impressions connecting the images with each other, the same figures appear to be passing in a continuous manner from one state to another.

[A very ingenious and interesting modification of this apparatus has lately been invented by William Lincoln, a student of Brown University, Providence, Rhode Island. In this the series of figures are drawn on long slips of paper, one of which at a time is placed for exhibition around the interior circumference of a hollow cylinder which is made to revolve on its axis in a vertical position. The figures are viewed through a series of narrow vertical slits in the cylinder, and as these pass the eye in rapid succession, they give in each instance a glimpse of the opposite figures, and thus produce the effect of apparent motion. With this apparatus, which is called a *zootrope*, several persons can see the effect at the same time. As the slits near the eye are moving in one direction, while the figures on the opposite concave side of the cylinder are moving with equal velocity in the opposite direction, the number of figures will appear to be double.

J. H.]

We return now to subjective colors, still taking for our guide the excellent dissertation of M. Plateau.

SUBJECTIVE COLORS.

First class—The succedaneous colors.—If we regard attentively a colored object placed on a black ground, keeping the eye constantly fixed on the same point, we shall see, at the end of some moments, the color of that object gradually lose something of its lustre; and if the eyes be then suddenly directed to a white surface, we shall presently see an image of the same form with the object appear, but of a color complementary to the latter; the term *complementary* being understood to designate two colors which, added to or blended with one another, produce white. Thus, the prolonged contemplation of a *red* object gives rise afterwards to a *green* image, and, conversely, the contemplation of a *green* object is followed by the appearance of a *red* image; if the object is yellow or blue, the consequent object will be *violet* or *orange*, and *vice versa*. Further, a *white* object produces in this way a blackish image, while a *black* object produces a white image, lighter than the ground on which it is delineated. All these images remain visible for some time; their intensity, as well as duration, being so much greater as the time during which the object has been observed is more considerable. These appearances form a portion of those to which has been given the name of *accidental colors*, a name conferred by Buffon, to whom, as Jurin asserts, we owe the first observations on this sort of phenomena. Time, it will be seen, enters essentially into this first order of subjective colors, since it is their nature to *succeed* to the objective colors which cause them to appear.

Properties of this first order of subjective colors.—The following are the principal properties presented by these singular appearances:

1. The disappearance of the images does not generally take place by a gradual and continuous diminution of intensity; they present, on the contrary, an alternation of disappearances and reappearances; occasionally the primitive impres-

sion is seen to recur once or even several times. The following experiment of M. Plateau shows this effect in a very remarkable manner: One of his eyes being closed and covered with a handkerchief, he adapted to the other a blackened tube about fifty centimetres in length and three in width, and regarded with fixed attention, for a minute at least, a red paper placed in a strong light, and so large that its borders were hidden by the tube; then, without uncovering the closed eye, he suddenly directed the tube to the ceiling of the apartment. A green circular image was now seen to form, but this was very soon replaced by a red image of feeble intensity; after which the green image reappeared, to be succeeded anew by a reddish image, and so on; the red image reappearing as often as four times, though with a progressive diminution of intensity of both the red and green.

2. The same phenomena are still manifested, when, in place of turning the eyes on a white surface, after having regarded the object a sufficient time, they are suddenly closed, and at the same time completely covered with a handkerchief on which the hands are applied; in this absolute darkness the image of the object will be seen perfectly delineated and colored with the complementary tint.

3. The accidental image appears of more or less size, according to the distance of the surface on which it is projected. When that surface is at the same distance from the eye as the object, the image presents the same magnitude; if the surface be more or less remote, the image appears proportionably augmented or diminished.

4. The subjective colors combine with one another in the same manner as the real colors; that is to say, from the accidental yellow and blue is formed green; from the accidental red and blue, violet. Of this we may satisfy ourselves by the following experiment, which we owe to P. Scherffer: Place beside one another, on a black ground, two small squares of paper, colored, the one violet, the other orange, (colors whose accidentals are yellow and blue,) and mark with a black point the middle of each of these squares. Then let the eyes be alternately directed to one and the other of the points, keeping them fixed upon each for about a second, and, after having repeated this operation a considerable number of times, close the eyes, or direct them towards a white surface. We shall now distinguish three squares in juxtaposition, of which the formation is easily conceived, the middle square being evidently formed from the superposition of the accidental colors produced by the two colors employed. In the supposed case the middle square will be *green*; it would be violet if the two colors employed were green and orange, the accidentals of which are the red or blue, &c. One case, however, forms an exception; that, namely, in which the two accidental colors which we combine are complementary the one to the other; then, instead of producing white, like two complementary real colors, they seem, on the contrary, only to give place to an effect of obscurity. Thus, when the two small squares of paper are, the one *green*, the other *red*, colors whose accidentals are *red* and *green*, the square which occupies the middle in the accidental image appears blackish if projected on a white ground, and completely black if the eyes be covered.

5. The accidental subjective colors combine with the real colors in the same manner as these last with one another; that is to say, from accidental red and real blue results violet; from accidental blue and real yellow, green. It is easy to be satisfied of the fact by projecting the accidental image on a surface painted of the color with which we wish to combine it; thus, by projecting on a leaf of *blue* paper the accidental image *red* proceeding from a green object, the resulting appearance is a fine violet. But it is necessary to bear in mind the following remarks: The object being always placed on a black ground, if we project its accidental image on a surface of the same color with itself, or, in other terms, on a surface whose color is complementary with that of the image, the latter

will appear only of a dark gray, as if the sensation were partially destroyed at that point of the surface. This will be the case, for example, if, after having looked for some time at a small piece of red paper placed on a black ground, we cast the eyes on a sheet of this same red paper. On the contrary, if we project the accidental image on a surface whose color is complementary to that of the object—that is to say, which is identical with that of the image—the latter will appear of a finer and purer color than the rest of the surface on which it is detached. This, for example, will take place with a *red* object and a *green* surface, with a yellow object and violet surface.

6. With a view to isolate from all extraneous influence the colored object looked at, we have assumed thus far that it rested on a black ground; if this ground be white, we obtain analogous effects as regards the color of the subjective image, but different as regards the relative brightness of that image, and the surface on which it is projected. Thus when the object rests on a black ground its accidental image, projected on a white surface, appears darker than the latter, and the contrary takes place if the object rests on a white ground.

In order to form a complete idea of the principal properties of these subjective colors, it remains to add the following facts:

7. We have said that when the eyelids are covered, after looking at a bright object, the primitive impression is usually found to persist for a considerable time. In such a case, if the covering be removed from the eyelids, or the eyes be opened and directed to a white surface, it generally occurs that this primitive impression immediately changes into an accidental image, which passes anew to the primitive state if the eyes be again covered; and the impression may thus be made to pass several times in succession from one to the other condition. The effect is very well manifested by the image of a window, and it was in this way that Franklin observed it. This image appears, to the eyes closed and covered, to be formed of luminous panes and dark sashes; but if the light be allowed to reach the eye, the panes become dark and the sashes luminous. If we close the eyes anew the first effect recurs, and so on alternately. Darwin has observed an analogous effect after looking at the setting sun. Mr. Brewster observes that if, after having looked at that orb, a reddish brown spectrum be seen, a certain degree of pressure upon the eye will cause this image to change into a green spectrum, and that if the pressure ceases the image will resume its former color.

Let us remark, in conclusion, that since the primitive impression always survives for some time the cause which has produced it, the accidental or subjective image must be regarded as in reality succeeding the objective image after a measurable space of time. If, in the greatest number of experiments relative to subjective colors, we cannot seize the trace of that first impression which is effaced, it is because it is generally too fugitive, and the time of its existence is further diminished by the circumstance that, in order to give much intensity and duration to the accidental image, the object should be regarded for quite a long time. In effect, while the prolonged contemplation of the object increases the intensity and duration of the second phenomenon, it shortens, in general, as we have seen, the duration of the first. There are cases, however, in which the succession of the two phenomena is perfectly manifest; thus, when M. Plateau contemplated the window during a space of time neither too long nor too short, he distinguished perfectly, first, the image of the window with its luminous panes and dark sashes, then the subjective image with the panes dark and the sashes luminous, &c.

As Scherffer has pointed out in his interesting memoir, we may convert these phenomena of vision into a source of amusement in the following manner: A bust of a man or woman is painted on a black ground in such colors as shall be accidental or subjective as regards the natural colors of such a figure. The skin would, in the supposed case, be of the color of bronze, the eyebrows and

hair white, the eyes would have the pupils white on a black ground, &c., which would of course produce a hideous representation; but on looking fixedly and sufficiently long at one point in this figure, and then casting the eyes on a white wall, there will be seen the appearance of a head with its natural colors.

Second class—Simultaneous subjective colors.—All the appearances with which we have been thus far occupied *succeed* the contemplation of the colored objects; but experiment proves that even *during* this contemplation there is manifested another order of phenomena consisting also in the apparition of complementary colors, and which form the second class of subjective or accidental colors. Thus Buffon remarked that whilst we are looking fixedly at a colored object placed on a black ground, there is perceptible outside of this object and along its contour a colored border of a tint similar to that of the subjective image, which is obtained by afterwards casting the eyes on another part of the white ground. Here, then, it is not at a succeeding time, but in the contiguous space that the accidental color arises. Some physicists, however, have assigned this phenomenon to the preceding class of subjective colors, by attributing it to the circumstance that, during the contemplation of the object, the eye cannot remain completely immovable, whence the image vacillates on the retina, and around this image there are parts of the retina which, after having received the impression of the colored light proceeding from the border of the object, receive the impression of the white ground. But without speaking of this circumstance, there are a multitude of other experiments which evince the production of accidental colors during the contemplation of colored objects.

Let us refer in the first place to *colored shadows*. Thus Rumford has shown that when a shadow is produced in a colored light, this shadow is tinged with the complementary color; if, for example, a paper be illuminated with green light, a body illuminated with white light and interposed between the green light and the paper, will cast on the latter a red shadow.

Thus again, according to the observations of Meusnier, when the interior of an apartment is illuminated only by the light of the sun transmitted through a curtain of colored stuff, and this curtain is pierced with a hole some millimetres in diameter, through which the direct light may penetrate, if this pencil of light be received on white paper, the part of the paper illumined by the white light of the sun appears vividly colored with a tint complementary to that of the curtain.

Prieur, of the Côte d'Or, has shown that if we place between the window and the eye a piece of colored paper possessing a certain transparence, and apply on this paper a small strip of white pasteboard, the strip will appear tinged with the complementary color; we shall see a *rose* color on *green* paper, *lilac* on *yellow* paper, &c. The effect is more decided for certain positions of the colored paper, positions which are readily found on making the experiment; moreover, if the small strip of pasteboard is itself colored, its own color combines with the complementary of the color of the paper. Thus a blue strip will appear violet on green paper, a yellow strip will appear green on orange colored paper, &c.

Let us cite further an experiment made by Dr. Smith: it consists in applying to one of the eyes a small tube of transparent colored paper, on which a strong light is thrown sideways. Then if a white surface be looked at, both eyes being open, the portion of that surface seen through the colored tube appears tinged with the complementary color.

[I have found the following arrangement to afford a very satisfactory means of exhibiting colored shadows: Place before the object-glass of a magic lantern, or before a convex lens through which a beam of light from the sun is passing, a plate of colored glass so as to cast upon a white screen or an opposite wall, in a dark room, a colored circle of, say, six feet in diameter. If on this circle the more feeble light of a candle is thrown, and an object, such as the hand, is in-

terposed between it and the screen, an intensely colored shadow will be exhibited. By varying the color of the glass-plate or that of the light of the candle, shadows of different colors and of different intensity will be produced.

J. H.]

Effect of contrast.—In the preceding experiments, the space whose color appears modified is supposed to be of small extent relatively to the colored surface which surrounds it, and the color of this last does not appear sensibly altered; yet M. Chevreul has proved in a general manner that this modification of colors is reciprocal; that is to say, that when we see simultaneously two colored objects placed in the neighborhood of one another, their two colors seem to react simultaneously in such a way that *to each of them is added the complementary color of the other*. Thus, when I place beside one another a *red* and a *yellow* object, the first will seem to tend more or less to *violet*, and the second to *green*. This reciprocal modification of the two colors is commonly too feeble to be perceived without having recourse to a particular expedient. The following is the ingenious process of M. Chevreul: two strips of paper or cloth of the two colors which it is proposed to submit to observation, one, for example, *red*, the other *yellow*, are pasted close to one another on a card; the strips should be 12 millimetres in breadth and 5 centimetres in length. Parallel to one of the strips is now pasted, at the distance of a millimetre, a second strip which is identical with the former in dimensions and color, and designed to serve as a term of comparison; the same operation is practiced in relation to the strip tinted with the other color, so that there are finally four colored strips, two of one color and two of the other. The two inner ones are in contact, and it remains to observe the modifications which they mutually produce on one another. With this view the card is to be looked at in a particular direction and for some seconds. The reciprocal effect of the two contiguous colors, which would escape us under ordinary circumstances, becomes in this way almost always sensible, by help of the exterior strips which serve for comparison. Thus, in the example we have chosen of *red* and *yellow* strips, it will be seen that the interior red strip will tend to a *violet* color, and the contiguous yellow strip to a *green*. M. Chevreul reports a great number of other examples which follow the same law; it is necessary to mention here only the following facts:

1. If the two colors employed are complementary one of the other, as red and green, they enliven one another by their juxtaposition, acquiring a remarkable brightness and purity.

2. If we place in juxtaposition with white any color whatever, the former is slightly tinted with the complementary color, and the color employed becomes brighter and deeper. Thus, by the contact of white and red, the first becomes greenish, the second deeper and more brilliant.

3. If any color be placed in contact with black, the latter takes, in a greater or less degree, the complementary tint of the color employed; and this last appears, in general, brighter and clearer.

4. Black and white undergo, likewise, by their juxtaposition, a reciprocal modification; the first becomes brighter, and the second deeper.

5. The mutual modifications of colors are not limited to cases in which the colored objects that modify one another are in contact. M. Chevreul proved, by experiment, that they may be rendered sensible, even when the objects are five centimetres apart, though the intensity of the effect is less as the distance is greater.

6. To these observations, derived from the memoir of M. Chevreul, M. Plateau adds another, which is verified every moment, and which may be deduced, in some sort, from 2, 3, and 4 preceding. When two neighboring objects differ in brightness, this difference appears, in general, augmented by their neighborhood; one appears brighter, the other duller, than if they were seen separately or surrounded with objects of a brightness equal to their own. Further, objects

moderately illuminated may disappear completely, as is shown by the results of M. Brewster's observations, when their image is portrayed on the retina, in the neighborhood of a part of the organ vividly excited by the presence of a brilliant object. Of this we may easily be convinced by regarding objects placed nearly behind the flame of a candle. These objects appear of a duller hue in proportion as their image more closely approaches that of the flame, and when the distance of the two images is very small they disappear altogether.

In order to complete our statement of the principal facts relating to accidental colors, we add to the experiments already cited the following, which we owe to Dr. Smith: Place a lighted candle very near one of the eyes, (the right eye, for instance,) but out of the line of the optical axis; then hold in front of the eyes a small strip of white paper, and direct your sight toward a remote point, so as to see the small slip double; the image seen by the right eye will appear green, and that seen by the left eye will appear of a reddish tint.

General law of simultaneous subjective colors.—Reflection on the assemblage of experiments which we have been reporting will show that they lead to the following conclusions:

When we look directly or indirectly at a colored space, there is manifested, beyond the outline of that space and to quite a considerable distance, the appearance, more or less decided, of a color complementary to its own, a color which continues to decrease in intensity in proportion as the distance augments. White and black, brightness and obscurity, are assimilated, in this case, to two colors complementary one to the other. If two colored spaces or objects are near one another, the effect is then reciprocal, regard being had to the extent and brightness of each of the two objects.

This development of the complementary color is especially distinct when the space on which we observe it is small and surrounded by a much more considerable extent of the color which is to produce this complementary color, as in the experiments of Rumford, Meusnier, and Prieur. The intensity of the effect is also much augmented if we contrive that the small space shall be feebly illuminated relatively to the colored ground on which it is projected. This serves to account for the colored appearances displayed in a great number of circumstances. Thus, as M. Brewster remarks, when an apartment whose walls are of a bright color is illuminated by the sun, those parts of the furniture on which the light does not directly fall seem to be tinged with a color complementary to that of the walls. So, again, according to the observation of M. Chevreul, when designs are imprinted on colored stuffs or papers, the color of these designs is usually modified by the complementary of that of the ground. Fault has been sometimes found with the manufacturer from this circumstance, because the designs do not appear of the color which had been prescribed. In this case, it can easily be determined whether the difference is owing to an effect of subjective color. It suffices to cut and apply some white paper in such manner that it shall cover the ground and allow only the design to be seen.

It is known that the shadows produced on a white wall at the rising or setting of the sun appear blue or green. It is because the light of that body is then of an orange or red tint, and the shadows are tinged with the complementary color. When an apartment in which candles are lit is still feebly illuminated by the light of departing day, the shadows produced by bodies interposed between the candles and white objects appear blue for the same reason. It is in this way, also, that M. Necker de Saussure accounts for the remarkable phenomena presented by the summit of Mont Blanc at the setting of the sun. M. Arago thought that to the same cause might be attributed the blue or green color under which the sun appeared through the extraordinary mist of 1831, assuming that the mists or clouds near the sun may have been colored red by reflection.

There is no one who has not observed that in a place partially illuminated by the sun, the parts which are in shadow appear much darker than if the sun

were so hidden by clouds that the shadow extended over all objects. On the contrary, the effect produced by the colored windows of Gothic churches proceeds, in great part, from the circumstance of their being environed by dark walls.

The facts which relate to this class of colors are susceptible of numerous applications in all the arts where the assortment of tints is involved. M. Chevreul mentions a great number relating to the art of the upholsterer, figured impressions on paper or cloth, &c. For example, he remarks that it is never proper, in assorting furniture, to combine upholstery of a bright red color with mahogany, for the greenish complementary tint which is developed by such accessories causes the reddish color which is prized in mahogany to disappear, and the latter then resembles oak or walnut, &c. M. Chevreul also applies these considerations to the arrangement of flowers in a parterre. The principal rule to be observed in this case is to place blue flowers beside orange-colored; violet flowers beside yellow. As regards red and rose-colored flowers, they never appear with so much advantage as when surrounded by verdure and white flowers. These should also be interposed between groups formed of blue and orange-colored flowers, violet and yellow flowers. We see that this arrangement is founded on the consideration that two complementary colors vivify one another by being associated, and that white heightens the tone of the colors which it is near. Considerations of the same kind are applicable to the female toilet. For example, the head-dress which would seem most advantageous for a fair complexion is a green hat, lined with rose; because the latter color is reflected on the visage, and the green which surrounds it further tends to add to this the effect of its complementary color.

Advantage has also been derived from the effects which result from a difference of brightness in adjacent objects. Painters, in order to judge well of the effect of a painting, observe it through a black tube. The colors in this way acquire considerable vivacity and brightness. The magic effect of the diorama depends in part on the circumstance that the picture alone is well illuminated, while all that surrounds it, as well as the hall containing the spectators, remains in a certain degree of obscurity. When it is desirable to produce a strong effect at the theatre, it is necessary to diminish as much as possible the light in the body of the hall.

This second class of colors may be made to afford curious and amusing effects in the following manner: Let colored papers having a certain transparency be spread on a rectangular frame of wood or pasteboard, in such a way that half the rectangle shall present a red paper and the other half a paper of some other color; then let a flower, of which all the parts have little width, two or three millimetres at most, be cut out of white pasteboard; for this purpose the petals and leaves may be cut in open-work. This flower is now to be placed on the colored papers in such manner that the stem and leaves shall be relieved on the red paper, and the flower on the other colored paper. If the frame be then held between the window and eye in a certain position, the stem and leaves will appear green, and the flower will seem colored with the tint complementary to that of the ground. If we have several such frames, in which one-half is always red and the other half of different colors, the same white flower, applied in succession on different grounds, will each time take a new color. It will be blue on an orange-colored ground, rose on a green ground, while the parts which would naturally be green continue of that color.

Intrinsic nature of the phenomenon of subjective colors of the second order.—It has been seen that the subjective colors of the first class are sometimes followed by one or more reappearances of the primitive impression. The colors which we are now examining sometimes present a phenomenon which is, in relation to space, what the former is in relation to time. We observe, under some circumstances, that at a certain distance from the outline of the colored space,

the complementary tint is replaced by a slight shade of the same color with that space. Thus, in the experiment of Prieur de la Côte d'Or, when the small strip of white pasteboard has a certain breadth, ten or twelve millimetres, for example, it occurs, for certain positions of the paper, that the edges only of the latter appear to take the complementary tint, and the interior is lightly tinged with the same color as the paper: for example, on a *red* paper, the small strip will have the edges green and the interior *rose-colored*; that is to say, at a certain distance from the outline of the red space, the green complementary tint is replaced by a shade of red.

It has also been seen that the appearance of the images of the first class succeeds the phenomenon of the persistence of the primitive impressions. Now, we find, in regard to the accidental colors of the second class, a fact which is the analogue of the former. In effect, physicists recognize that the impression produced on the retina extends a little beyond the space directly excited by the light; so that if we observe a red object, for instance, on a black ground, the red image perceived is a little more extended than it would be if the sensation were limited to the space on which the red light directly strikes. From this it results, that if we consider the appearances which are manifested beyond the colored space, beginning at its real outline and proceeding outwardly, the impression of its color extends to a short distance, beyond which the complementary color appears; while this latter, as we have seen, is replaced at a still greater distance by a new development of the first color.

Conclusions.—Recapitulation.—Thus, on comparing the two preceding classes of subjective colors, we see, that in the first, as soon as the retina ceases to be directly excited by the presence of the colored object, there occur: 1st. A persistence, generally very short, of the primitive impression; 2d. The apparition of the accidental image; 3d. Usually successive disappearances and reappearances, more or less numerous, of that accidental image; and, in certain cases, alternate apparitions of the primitive impression and of the accidental image.

In the second class, beyond the outline which the colored space or object would directly present, we find: 1st. A prolongation, to a certain distance, of the real impression; 2d. Beyond that prolongation and to a distance usually considerable, a development of the accidental color; 3d. Under certain circumstances, beyond the space colored by the accidental color, a space which in this case is of small extent, we observe a new development of the real color of the object.

It will hence be seen that the phenomena of the second class are really, in relation to *space*, what the phenomena of the first class are in relation to *time*. There are other appearances which depend alike on these two sorts of accidental colors.

New class of phenomena.—We will cite only a few examples: 1st. When instead of placing the object which we are observing on a white or black ground, we place it on a colored ground of sufficient extent, the color of the image afterwards perceived on casting the eyes on a white surface is not simply the complementary of the color of the object; it is found to be combined with the color of the ground on which the object is placed. Thus a small piece of *orange-colored* paper placed on a sheet of *yellow* paper, will produce a *green* accidental image on a *violet* ground; that is to say, the image will be composed of *blue*, which is the complementary of the *orange*, and of *yellow*, which is the color of the paper itself on which the object was placed. Thus, too, a small piece of *violet* paper placed on a sheet of *red* paper will produce an *orange-colored* image on a *green* ground. These effects were remarked by Darwin, and depend on the two classes of subjective colors which we have been considering. In effect, while we are observing an *orange-colored* object placed on a *yellow* ground, a light tint of *violet* produced by the neighborhood of the *yellow* will become

mixed with that orange color; and when afterwards the eyes are directed to a *white* surface, the phenomena of succession manifesting themselves, the *orange* changes into *blue*, and the *violet* which was mixed with it also changes into its complementary—that is to say, into *yellow*; whence the image must appear composed of *yellow* and *blue*, or *green*.

2d. When the object we look at is *black* and placed on a colored ground, its accidental image always appears tinged with the color of that ground. Thus, a *black* object placed on a *red* ground will give a *pale red* accidental image on a *green* ground, &c. The effect is more decided with the eyes closed and covered. Here again, while we were looking at the black object, a light complementary tint of the color of the ground manifested itself, a tint which, when we cease to look at the object, changes into its complementary—that is to say, into the color of the ground itself.

3d. If, on the contrary, we look fixedly and sufficiently long at a small colored object on a black ground of adequate extent, and afterwards cover our eyes, the accidental image appears surrounded to a certain distance by an aureola lightly tinged with the color of the object itself. Thus, a *red* object produces a *green* image surrounded by a *reddish* aureola; an effect which evidently proceeds from the circumstance that, during the contemplation of the colored object, the space which surrounds it takes, to a certain distance, a light tint complementary of the color of the object, and this tint afterwards, to the closed and covered eyes, changes into its complementary—that is to say, into the color of the object itself.

Under the name of subjective colors are further comprised certain colored appearances, produced under circumstances entirely different: for example, when the eye is subjected to pressure in the dark, or when a blow is received on the eye, or in certain indispositions of the stomach, &c. Of these we shall say a few words hereafter.

DIFFERENT HYPOTHESES ADVANCED FOR THE EXPLANATION OF THESE SINGULAR PHENOMENA.

Colors of the first class.—Theory of Scherffer.—The theory of which we owe the first idea to Scherffer seems now adopted, with a slight simplification, by the generality of physicists. It supposes that the sustained action of the rays of a certain color on a part of the retina momentarily diminishes its sensibility for rays of that color, so that if the eyes be then directed to a white surface the portion of the retina whose sensibility is thus modified can, for some time, only receive a complete impression from the constituent part of this white which is complementary to the color that has fatigued the organ. Thus, on this hypothesis, when we contemplate fixedly and sufficiently long a *red* object, the part of the retina on which the image of the object is depicted becomes less sensible to the *red* light; and if the eyes be then directed to a white surface, since this white may be considered as composed of *red* and *green*, an image will be perceived in which the green predominates. This simple and ingenious theory completely explains most of the phenomena relative to subjective colors of the first class; the diminution of brightness of the colored object in proportion as the contemplation is prolonged; the increase of intensity of the image, the longer the object has been observed; the combination of the accidental colors with one another, &c. Still there are important facts for the explanation of which this theory is evidently insufficient. Such, for example, are: 1st, the production of subjective colors in complete darkness; how should the simple insensibility of the organ for a color produce, in the absence of all light, the sensation of the complementary color? 2d. The combination of the accidental with the real colors; if a *red* accidental image is occasioned by the retina having become less sensible to *green*, how comes it that *violet* is seen when this

image is projected on a *blue* surface? After having regarded fixedly a small circle of paper placed in the *red* ray, and then turned the eyes upon a larger circle illuminated by the *yellow* ray, M. Plateau distinctly saw upon the latter an image of a fine *yellowish green*, while, if the retina had simply become insensible to red, it could evidently have perceived only a *blackish* image. 3d. The apparently irregular process of decrease presented by the accidental images. The following fact would suffice, it might seem, to overthrow it completely: When, after having pressed his eyes in a particular manner, this pressure was made suddenly to cease, M. Plateau, his eyes being closed and covered, saw a large *red* spot bordered with *green*; but as soon as he opened his eyes or cast them on a white surface, these two colors changed into their complementaries; the spot became *green* and the surrounding border *red*. But here no exterior light had been present to fatigue the organ and to render it less sensible to certain colors; we have here spontaneous sensations of *red* and *green*, which change into sensations of *green* and *red*.

Colors of the second class.—Theory of contrast.—The most generally accepted theory attributes these colors to contrast; that is to say, to a moral cause which renders more intense our perception of whatever is *unlike* in the colors collated with one another, while it weakens the perception of what they have *in common*; thus a small *white* object being projected upon a colored ground—a *red* one, for instance—the effect of the contrast is to diminish our perception of the *red* constituent part of that *white*, and to exalt, on the contrary, our perception of the complementary part, or the *green*. If, for example, a *green* object be placed in juxtaposition with a *violet* color, contrast will enfeeble the perception of the *blue*, which is common to the two objects, and will enliven, on the other hand, the sensation of the *yellow* and *red*, by which they differ; the first of the two objects will therefore appear more *yellow* and the second more *red*, which is in accordance with the law indicated by M. Chevreul. If the objects finally differ in brightness, contrast will likewise intensify this difference, as in the case, for example, of black placed in presence of white, &c.

Without entirely denying the influence of contrast, M. Plateau thinks that this cause, though capable of increasing or even producing in certain cases the subjective phenomena of the second class, is not that to which they can be collectively attributed. His reasons are the following: 1st, how is it possible to admit that a moral cause should be competent to create, in complete darkness, a sensation of light purely imaginary, like that of the aureolas before mentioned? 2d, in the experiments of M. Chevreul, since the effect was manifested when two colors in juxtaposition had no ingredient common to them, the operation of contrast is more difficult to explain. Several physicists, Young among others, have attempted to extend to this second class of colors the hypothesis of a modification in the sensibility of the retina, by assuming that when a portion of the retina is subjected to the action of any color the surrounding parts lose something of their sensibility for that color. This theory, indeed, attributes the phenomena to a physical cause, but it is, nevertheless, wholly insufficient. What, in that case, would become of the phenomena of accidental colors produced in darkness? How should we explain the manifestation, in certain cases, of a tint identical with that of the colored object at some distance from the outline of that object? &c.

Theory of M. Plateau.—We shall, in the first place, remark with Scherffier that it results from the apparent change of magnitude of the accidental images, when projected on surfaces more or less distant; that these images are due to a physical modification of the organ. Such would, in effect, be the phenomenon produced, if it be admitted that a definite portion of the retina undergoes any modification; for, as the resulting image corresponds to a constant visual angle, that image must seem to us the greater according as we refer it to a greater distance. We see no reason, on the contrary, why it should be so, on the hy-

pothesis of a moral cause; the image should then always appear to us of the same magnitude with the object. Analogy, moreover, would lead us to regard the colors of the second class as owing, like the first, to a physical modification of the organ.

If, now, we compare the accidental impressions with the corresponding real impressions, we shall soon see that the first should be regarded as of a nature *opposed* to that of the second: 1st, the opposition is evident for the case of a white object on a black ground; 2dly, it may be said, in general, that two complementary colors are opposed, since their tints neutralize one another by producing white; but, as has been seen, the opposition goes further in the case of a real impression and the corresponding accidental impression; it then destroys the perception of brightness by producing *black*; 3dly, while two complementary real colors produce *white* by their combination, two accidental complementary colors, on the contrary, produce *black*.

The foregoing being admitted, let us recur to the collective phenomena which succeed the contemplation of colored objects, or which accompany the contemplation. When a portion of the retina, after having been excited by the presence of a colored object, is suddenly withdrawn from that action, it regains by degrees the normal state, producing for us the phenomena of the persistence of the primitive impression and of the accidental colors of the first class.

On the other hand, if, while the retina is subjected to the action of the colored light, we examine the parts of the organ which surround the space directly excited, we see that the normal state is not found except at a distance more or less considerable from the contour of that space, and that this normal state is reached in passing through the effects of irradiation and of the accidental colors of the second class.

Thus, on the one hand, the *persistence of the primitive impression and the accidental colors of the first class* constitute the passage from the state of excitation of a portion of the retina to the normal state, when we consider that passage *in regard to time*; on the other hand, the *irradiation and the accidental colors of the second class* constitute the passage from the state of excitation of this same portion of the retina to the normal state, when we consider this passage *in regard to space*. All the phenomena, therefore, with which we are occupied must be referable to the same principle; and M. Plateau has pointed out that they are connected with one another in the most natural manner; that they are simple consequences of the law of continuity.

Let us examine, then, more closely the transition to the normal state in regard to *time*. When the retina is suddenly withdrawn from the action of the rays emitted from the colored object, the state of excitation of the organ at first continues for some time, growing feebler, yet *without changing its nature*, and thence results the persistence of the primitive impression; but presently this state of the organ gives place to an *opposite* state, whence results the *subjective image* of the object. This new sensation soon attains a maximum of intensity, and grows feebler in its turn, usually manifesting, however, an oscillatory progress, more or less regular, sometimes confined to a succession of disappearances and reappearances, sometimes alternating with recurrences of the primitive impression. Now, it is impossible not to see a striking analogy between these phenomena and the movement of a body removed from a position of stable equilibrium and which returns to it by an oscillatory action. Are we not naturally led, by the whole train of phenomena, to admit that the retina, diverted from its normal state by the presence of a colored object and then suddenly left to itself, at first regains rapidly the point of repose, but that, impelled by its own movement, it passes that point and attains an opposite state, whence it tends anew toward the point of repose, at which it finally arrives in a permanent manner only after a series of decreasing oscillations?

If, now, we examine under the same point of view the transition to the normal

state in regard to *space*, it will be seen that the state of excitation caused by the light emanating from the object is not limited to the portion of the retina directly struck by that light, but that this state is prolonged without changing its nature to a small distance from the contour of that position, producing the phenomenon of irradiation, which we will presently explain; that beyond this limit is manifested an opposite state of the organ, from which results the accidental color, and that, in certain cases, at a still greater distance, the color of the object is repeated. Here, therefore, we have oscillations in regard to *space* instead of oscillations in regard to *time*, and we discover an equal analogy with natural phenomena; it is thus, in effect, that in a vibrating surface the parts separated by nodal lines exist in opposite states; that, in liquid waves, we find as we remove from the centre of excitation, alternate states of elevation and depression becoming less and less distinguishable.

It is under this general point of view that M. Plateau regards the assemblage of subjective phenomena. This theory, so simple that we had ourselves adopted it before knowing that it had been stated and maintained by the distinguished professor of Liege, does not merely explain all the facts, but almost enables us to discover them *a priori*. Let it be once supposed, in effect, that an organ which has been excited is then suddenly left to itself, and we cannot conceive otherwise than that it will return promptly, but in an interrupted manner, to its normal state, just as, during the excitation, it cannot be supposed that along the outline of the excited space there should be an abrupt passage from the state of excitation to the state of repose.

M. Plateau, in order the better to substantiate his ingenious theory, proceeded to submit to direct experiment the undulatory movement of the impression. He found, first, that the number of oscillations is greater in proportion to the greater length of time during which the object has been observed; second, that this time, on the contrary, does not appear to have any influence on the duration of each of the oscillations taken separately. The manner of operating was as follows: One of two physicists regarded fixedly, during a stated number of seconds, a bit of orange-colored paper placed on a black ground in a well-lighted situation, and then turned his eyes quickly on a white wall. He then indicated with the greatest possible precision the moments at which the accidental impression attained its successive *maxima* of intensity, while the other observer, provided with a watch marking the half-seconds, noted the time. As many as eleven reappearances were thus verified by MM. Plateau and Quételet.

One word more on the before-cited experiment of Dr. Smith. M. Plateau is of the opinion that the green appearance of the image perceived by the excited eye should be attributed to the circumstance that a part of the light of the candle traverses the envelopes of the eye and diffuses on the retina a reddish hue; the white image, being environed by this red light, must then seem tinged with the complementary color, green. What confirms him in this opinion is that the effect is perfectly well produced when the light of the candle is prevented, by means of a small opaque obstacle held near the eye, from penetrating by the pupil, while it is still permitted to illuminate the outer parts of the organ. In this case, the image of the flame is in no manner depicted on the retina, and yet the red and green appearances are equally produced. If it be objected, says M. Plateau, that the red light which traverses the envelopes of the eye is disseminated everywhere, and that it must diffuse itself also on the image of the small strip, which should consequently appear reddish and not greenish, I would answer by citing an analogous fact reported by M. Gergonne.

Into one of the schools of mathematics in the college of Montpellier fronting the east, the rays of the morning sun in summer only penetrate after having traversed the foliage of the acacias with which the court is planted. On entering this apartment, all the objects within it present a greenish tint, which seems to be gradually effaced; but then another phenomenon succeeds—all the traces

of chalk upon the black-board become invested with hues more or less rose-colored. These traces, though receiving the green light like the rest of the tableau, are tinged nevertheless with the complementary color. M. Trechsel, in his memoir on colored shadows, has adduced, from experiment, an analogous phenomenon: let the sun's light, introduced cautiously by slightly raising the curtain for instance, be made to fall on the back of the *camera obscura* when it is colored *green* by an object-glass of that hue, the place illuminated by the sun's light will assume a tint of pale *red*, without the presence of any shadow. If the object-glass be *red*, the light of day will cause the place on which it falls to appear of a *greenish blue*. In the observation of M. Gergonne, the white chalk replaced the white ray.

M. Plateau's theory of objective colors is for us the precise expression of the facts; it explains everything, nay, it foresees everything. There is but one class of phenomena which still leaves anything like serious uncertainty. Colored shadows bear no resemblance to other accidental colors; the latter are, in general, very difficult to perceive and very fugitive; the colored shadows, on the contrary, are vivid, well defined, persistent, and the mind, however convinced, repels with difficulty the idea that they are no illusions, no purely subjective appearance, but in truth real colors. The following was said of them by Count Rumford, who produced them by receiving the sun's light through two small apertures perforated at sufficient distances to obtain two distinct shadows of the same opaque body, which apertures he covered with colored glasses: "The shadows," he says, "were tinged with an infinite variety of colors, the most unexpected and often the most beautiful; they varied continually, sometimes with inconceivable rapidity; the eyes were fascinated, and the attention involuntarily fixed on this magic tableau, equally enchanting and new. The clouds borne by the wind seemed, each in its turn, to bring an endless succession of different colors, with the most harmonious tints." Happily, to the enraptured amateur succeeded the cool philosopher; he would fain resist the testimony of his senses; he suspects that these brilliant appearances are deceptive, and that they can only be the effect of contrast between neighboring colors; he therefore submits these charming illusions to the control of new experiments, and another light, that of truth, dawns upon him. He places a friend in the position he had occupied in order to be certain that these brilliant phenomena have not ceased, and limiting his own vision by means of a tube blackened within, directs it so as to see the shadows alone; and now, while the friend is in ecstasies over its brilliant color, the rigid investigator sees nothing but an obscure and colorless shadow. The demonstration is exact and complete, and it will be no further necessary to explore these colored shadows with sensitive plates and papers in order to assure ourselves that in no manner do they produce the action indicated by their color.

The memoir of M. Fechner on subjective colors, published in 1840 in the *Annals of Poggendorff*, is the most recent treatise upon these subtle inquiries. We have studied it with great care, and if we do not here analyze it, it is because, while founded on observations well made and judiciously reasoned, it has seemed to us to contain no fact essentially new. On reading it, we have remained satisfied that, in the phenomenon of colored shadows, contrast alone, and not irradiation, is in action, and that the final reason of the problem is to be sought in a fundamental principle analogous to that of relative movement. This last principle, we know, consists in the essential fact that the relative movement of two or more bodies in motion by no means depends on the common forces or velocities, but solely on the forces in excess, that is to say, the forces which act on some of the bodies without acting on the others. In like manner, as regards light, the relative sensation that is really perceived by the eye, does not depend on the common tints, but on the excedent or differential tints. Thus, the portion of a green ground illuminated by a white ray on the white chalk, as we have seen, appears red in certain circumstances. So too, if a white ground has

been illuminated with a colored light, with orange for instance, and white light be made to fall on a shadow projected in that colored light, the orange ray of the white light will not be sensible to the eye, because it is common to the ray and to the ground; we shall perceive, therefore, only the united sensation of the other rays contained in the pencil; these will produce a greenish white tint complementary to the orange, and with this the shadow will appear to be invested.

We are thus led to distinguish three orders of subjective colors: the first would have its cause in the successive vibrations of the retina; the second would be explained by irradiation, or by the participation of several portions of the retina vibrating simultaneously under the impression of a first excitation; the third would find its reason in contrast, or the elimination of the colors common to the two rays which act at the same time on the organ of vision.

We make no pretensions, however, to giving a definitive solution of this difficult problem, and pronouncing in the last resort between two physicists so distinguished as MM. Plateau and Fechner. Divided in a theoretical point of view, they have been, alas, too closely associated in a common misfortune. Victims of the experiments which they have pursued with excessive ardor, in the highly laudable but hazardous attempt to elucidate the nature of subjective or accidental colors, both have been smitten with blindness; Belgium and Germany have both been called upon to mourn the incapacity inflicted by that cruel infirmity on these noble martyrs of science. M. Fechner, after several years of suffering, has happily recovered his sight as if by miracle. It was our fortune to witness the restoration of the indefatigable physicist of Leipsig; with how much joy should we learn the recovery of the gifted and laborious author of the admirable memoir on irradiation—a memoir which we propose presently to analyze, in order more clearly to illustrate what we have said respecting subjective colors.

Researches of M. Chevreul on the laws of simultaneous contrast.—The preceding dissertation comprises all that is essential in the learned researches of M. Chevreul; but we might reasonably be accused of injustice did we not give a summary account of the labors of our eminent compatriot, remarkable as they are in a practical point of view. M. Chevreul was the first who clearly stated this general law: in a case in which the eye sees at the same time two colors which are in contact with each other, it sees them as unlike as is possible; these mutual modifications of colors are not limited to the case in which the colored zones thus influenced are contiguous to one another, for we still perceive them when these zones are separated. He has clearly established that whenever the eye sees simultaneously two colored objects, all that is analogous in the sensation of the two colors undergoes such an abatement that all that is different becomes more sensible in the simultaneous impression of those two colors on the retina. The experimental demonstration of these two propositions essentially distinguishes his observations from those which had been made before. The law of these modifications being once known enables us to foresee the changes which two given colors, when we know the complementary colors of each of them and their relative tone, will undergo by juxtaposition; for these changes must be the result of the complementary of the one being added to the other; and if the two colors have not the same height of tone, that which is deeper will appear more so, and the other will appear lighter than it is; provided, however, that this last effect be not destroyed by the former. After so accurate and complete a study of the influence of colors, M. Chevreul might proceed with confidence to the details of application. He teaches by turns the difficult art of assorting colored threads in such a way as to faithfully reproduce the tints of a painting; of giving to paintings, to tapestry, to carpets the highest perfection of coloring; of stamping designs on cloth and paper; of adapting the accessories of furniture; of giving greater brilliancy to the colored windows of cathedrals; of distributing flowers in gardens; of choosing and distributing the colors of raiment; of judging more

correctly of the tints of dyed stuffs. He gives the reason of the fact, long and generally known, that an assortment of complementary colors is never disagreeable, showing from his experiments that these colors re-enforce and embellish one another by proximity, whatever difference may otherwise exist between the bodies placed in juxtaposition. He proves, on the other hand, that if the non-complementary colors which approximate most to the seven primitive colors are, in general, embellished by juxtaposition, they yet seem to the eye more or less inappropriate; that the greater the analogy of colors the greater is the probability that their mutual juxtaposition will be injurious to one of them, or even to both; that if theory cannot prescribe, for the satisfaction of the eye, the arrangement of non-complementary colors in so decisive a manner as it is competent to do with regard to complementary colors, it is because of the impossibility of designating at present in a precise manner these innumerable colors of bodies in default of invariable types to which they might be referred, such as are, for instance, the colored rings of Newton.

Chromatic scale of M. Nobili.—These last expressions of M. Chevreul recall to us an excellent memoir of Nobili on colors in general, and particularly on a new chromatic scale. Author of metallochromy, that wonderful art by means of which he obtained on plates of steel the most brilliant colors by depositing on their surface, through electro-chemical processes, thin coats of different saline substances, of acetate of lead for instance, and persuaded that science never so well appreciates its own interest as when it associates itself with the arts, the distinguished physicist last mentioned devoted long hours to the formation of a chromatic scale composed of forty-four tints, disposed according to the order of the thin layers or films which form them. This assemblage produced an indescribable effect; it was of the same nature with that which is produced on the ear by a scale of semitones executed by an exquisite vocal organ; so great, indeed, was the pleasure of contemplating these colors which passed gradually from one tone to another, that the eye could scarcely be satiated with the view of so charming a spectacle. Nobili attempted to reproduce his scale in oil and water-colors; but the best executed copies gave but an imperfect idea of the original colors, and since Nobili is dead, carrying with him not the secret of his art but the untiring application, the incommunicable dexterity which alone can with certainty produce uniformity of tints, science and art will, perhaps, have long to deplore the want of a gamut of colors universally adopted.

A singular anomaly of the chromatic scale of Nobili particularly attracted attention; the green was found far from the blue, between the red and yellow. Men of art were surprised at this inversion; when the finest green tints of the gamut were submitted to them, impelled by habit, they placed them among the yellows and blues of the second interval; but, in that position they fatigued the eye; harmony was destroyed, and was not re-established except by returning to the primitive order. But in what consists this harmony? It may be felt, but not defined. Its principal character in nature is the conjunction of two complementary colors, or colors, as we have seen, of such a nature that one gives rise to the other. Venturi was right in saying: *Agreeable and harmonious above all is the union or succession of those colors which are in correspondence with one another, so that the sensation of one draws after it the imaginative sensation of the other.* In this we evidently have but one of the aspects of the harmony of colors; it extends much further; but, in the present state of the science, it would be impossible to convey complete ideas on the subject.

Nobili concluded his long memoir with some curious and useful remarks on the clearness, the strength, the beauty, the warmth and coolness, the liveliness and the gravity of colors. The clearest is the yellow; a clear tint results from the mixture of little color with much white light; a strong tint is the product of much color and little white light; orange is the brightest, yellow is monotonous; yellow and red are warm, light blue is cool; red and orange are gay, violet and

indigo grave. Nobili undertakes to explain this last difference by an original comparison between colors and sounds. An exclamation, a cry of joy, are composed of notes which proceed from grave to shrill; a wail, an accent of pain, descend from shrill to grave; the same series of notes chanted by ascending from grave to shrill, or descending from shrill to grave, produces contrary effects; gaiety in the first case, sadness in the second. Now, if we take the complementary tints of red and violet, which are the bluish green and the greenish yellow, it will be seen that we pass, in the first case, from longer vibrations to shorter ones; in the second case it is the reverse. This digression will be pardoned us, if only as a grateful recollection of the eminent and excellent savant who honored us with a share of his friendship.

Singular effect in optics.—Before proceeding to treat of irradiation, we must notice a singular effect produced by the juxtaposition of certain colors which was observed by M. Wheatstone. This savant had remarked on some occasion that a carpet having a small green and red figure presented, when it was illuminated by gas-light and attentively observed, the appearance of a movement in all the figures of the design. To this optical illusion the name of *palpitating hearts* was given, because one of the figures of the pattern was a heart. M. Wheatstone made a trial of several other designs formed of other pairs of complementary colors, and ascertained that the movement was perceptible, but never so decidedly as with the colors green and red. He was not able to distinguish the phenomenon except by the light of gas; but M. Brewster afterwards perceived that it was produced also by the solar light admitted through a small hole in the darkened chamber. In order to explain this fact, M. Brewster recalls the experiment which shows that any fixed object appears to move when the light that illuminates it is constantly changing in position and intensity. The experiment is made by moving a candle before a statue rapidly and in all directions; the flashes of light and the shadows, incessantly shifting, produce different appearances which resemble the movements of the figures on the red and green carpet. In the case of the *palpitating hearts*, the mixture of two complementary colors, whether it be regarded directly or as producing accidental impressions, forms a succession of shades and lights which give rise to the apparent movement of the figures. When one of the *hearts* is looked at fixedly, it ceases to move almost entirely, while the others, which are seen obliquely, appear to vibrate in a very distinct manner; this effect is attributable to the augmentation of the sensibility of the retina in oblique vision, in proportion as the point which receives the impression is more remote from the opening of the pupil.

IRRADIATION.

Definition.—Irradiation is properly the phenomenon by virtue of which a luminous object environed by an obscure space appears more or less amplified. This apparent encroachment of the border of a luminous object on the obscure space which surrounds it, involves an opposite illusion in the case of a dark object projected on a luminous field: the dimensions of this object appear diminished, because the irradiation produced along its outline by the luminous field falls within the outline. A singular difference of opinion divided astronomers in relation even to the existence of aberration; some admitting it, others calling it in doubt; these doubts solely resulted from the fact that astronomers had not clearly distinguished the part played by ocular irradiation in observations made by means of the telescope.

Existence of irradiation.—To verify the phenomenon it suffices to cast the eyes on the luminous crescent of the moon. Every one knows that when the moon appears under the form of a crescent, while at the same time the rest of its disk is seen faintly illuminated by an ash-colored light, the exterior outline of the luminous portion seems to protrude considerably beyond that of the ob-

scure portion ; in other words, the crescent appears to form part of a disk sensibly greater than that to which the rest of the planet belongs. If a decisive experiment, capable of being repeated at all times, be desired, it may be made in the following manner : On a rectangular blackened pasteboard, 20 centimetres in height and 15 in breadth, let two white rectangles or windows, separated by a black band of a demi-centimetre in breadth, be left blank on the upper half ; let this band, prolonged in blank, divide into two black portions the lower half of the pasteboard. Thus there are two bands of equal width, but the one white on a black ground, the other black on a white ground. To make use of this apparatus, it is to be placed vertically near a window, so as to be well lighted, and observed from a distance of four or five metres. The white band will now appear considerably wider than the upper and black band, and this apparent difference increases with the distance. It will be perceived that the apparatus is constructed in such a manner as to augment the effect resulting from irradiation ; for if, on the one hand, the white band acquires apparently additional width, the black band, on the other, is diminished by the irradiations of the two lateral white spaces. Irradiation, therefore, with the naked eye, must be regarded as one of the best established facts of vision, and one of the most easily verified. Its intensity is not the same in different eyes, and even varies in the same individual, but there is no one who cannot observe it in a manner more or less distinct. In telescopes, it becomes complicated ; its effect is diminished ; the total error depends at once on the enlargement in itself, on the lustre of the image, the nature as well as state of the eye, and the perfection of the instrument—qualities essentially variable. If, when micrometers of double image were employed to measure the irradiation, it has not been practicable to find its sensible value ; if it has even occurred that the double image micrometer has caused an irradiation to disappear which had been realized by the thread micrometer, this depends on a cause revealed by experiments which have rigorously demonstrated the following general principle : two irradiations in presence of and sufficiently near one another, both undergo a diminution. This diminution is so much the more considerable as the borders of the luminous spaces from which the two irradiations issue approach one another more closely.

On the cause of ocular irradiation.—The theory of irradiation now universally adopted consists in the admission that the impression produced on the eye by a luminous object is propagated on the retina to a small distance around the space directly excited by the light, so that the total sensation corresponds to an image somewhat greater than the true one. The principle of continuity on which this theory is founded is so simple, that, if the existence of irradiation were not known, it would seem that it might be foreseen *a priori*. Let us suppose, in effect, that a luminous or illuminated body projected on a ground completely black, is attentively looked at. The light emanating from this object will strike a definite portion of the retina, and the rest of the organ will not be subjected to any direct excitation. But is it presumable that the parts of the retina which immediately environ the portion directly excited should be in perfect repose ? It will scarcely be admitted that a state of energetic excitement and a state of absolute repose should be thus, in the same organ, in immediate contact. We are hence led *a priori* to think that, around the image of the object, must be manifested some appearance which constitutes the gradual transition between the state of excitation of the part of the organ subjected to the direct action of the light, and the state of repose of the parts more remote. Now, in whatever manner this transition is effected, it must be considered as altogether probable that the excitation is propagated to a greater or less distance, without a change of nature, around the space struck by the light, and that hence there will result the sensation of a larger image. Irradiation will be thus, in relation to space, what the known phenomenon of the persistence of impressions of the retina is

in relation to time. On one hand, when the retina, after having been excited for a certain time by the light emanating from an object, is suddenly withdrawn from that action, the impression still persists during some moments. On the other hand, while the retina is subjected to the action of the light emanating from an object, the impression will extend to a small distance around the image of that object. Both one and the other phenomenon would be results of a simple law of continuity, in virtue of which, when a portion of the organ is diverted from its normal condition, the dynamic state which results can neither be instantaneously annihilated, nor subsist in immediate contiguity with a state of perfect repose.

To these purely rational considerations, Mr. Plateau adds a great number of facts, a few of which only will be here cited: 1st. We know that the small space which, in the retina, corresponds to the insertion of the optic nerve, and which is called the *punctum cæcum*, appears insensible to the action of the direct light; hence, if a small white or colored object be placed on a black surface, and, closing one eye, we direct the other in such a manner that the image of this object falls on the point in question, the object disappears. Now, if instead of a colored object on a black ground, we place a black object on a colored ground, the object equally disappears, and the color of the surface extends itself over the place which it occupies. The most insensible part of the retina, therefore, is impressible by communication; in other words, the surrounding impression is propagated laterally over this small space; the same then, with stronger reason, must be the case in the sensitive portions. 2d. It is a constant fact that irradiation augments with the duration of the contemplation of the object; it is admitted, moreover, by physicists that by continued contemplation the retina becomes less and less susceptible of impression by the direct light; if these two facts be considered, the conclusion must be that in proportion as the direct light seems to lose its power over the retina, the propagated impression will be more strongly developed. 3d. On a colored ground place a narrow strip of white paper, or else trace a black line on a white surface, and let the eye be then fixed on another point distant from this small object some seven or eight centimetres, so that the latter shall be only seen indirectly. At the end of some instants, if the eye be kept motionless, the object completely disappears, and the color of the surrounding surface seems to extend over the place which it occupies. The lateral propagation of the impressions to the adjacent parts of the retina is therefore as nearly as possible demonstrated.

On the whole, then, the theory which attributes irradiation to a propagation of the impression is supported by considerations of reason, analogy, and experiment. This same theory, moreover, explains the different laws to which the phenomenon is subject. Hence we infer, in the first place, that irradiation, a phenomenon of sensation, cannot, as experience confirms, be the same in different persons; and that in the same eye it will be sometimes more, sometimes less, developed. It results, in the second place, that irradiation must appear so much the greater as the luminous object is more remote; for, first, the absolute width of the small band of propagated impression which surrounds on the retina the image of the object, cannot depend on that object, provided the latter preserves the same brightness and continues to be projected on a ground equally dark; hence it follows that the visual angle, subtended by this same width, must remain equally constant whatever be the distance. Now, as the observer necessarily refers the resulting appearance to the object itself, he must attribute to the small luminous band, which to him seems added to the contour of the object, an absolute width proportional to the distance which exists, or which he supposes to exist, between the object and his eye. In effect, if we imagine for an instant the appearance to be a reality, and that a similar small band is really added to the outline of the object, it can evidently not be seen under a visual angle constant and independent of the distance, except by making its absolute

width vary proportionally with that distance. If, now, we could demonstrate that this apparent augmentation really corresponds to a visual angle constant for the same eye and the same object, this demonstration would constitute one of the most powerful arguments that could be brought in favor of the theory in question; for this constancy of the visual angle is the principal character of the phenomena of vision, which depend on a modification undergone by a portion of the retina of a constant extent. This important fact M. Plateau has succeeded in establishing by the help of an apparatus which we will not at present stop to describe. It is sufficiently demonstrated, by a long series of observations made on many persons, that the angular value of the irradiation is independent of the distance from the object to the eye; and it thence results, as a necessary corollary, that the absolute width which we attribute to the irradiation is, all things else being equal, proportional to the distance which exists, or which appears to us to exist, between the object and ourselves. Irradiation had not been observed hitherto by physicists and astronomers, except for remote objects. It will be found, however, to exist for small as well as great distances—only, the apparent effect diminishing proportionably with the distance, it strikes us less in the case of near objects; but, from the experiments of M. Plateau, it may be accepted as an ascertained fact that irradiation manifests itself at all distances, from the shortest susceptible of distinct division to any degree of remoteness. There was still an important question to resolve. It was necessary to determine approximately the irradiation in the case of the same person in different circumstances. This M. Plateau has done, and has satisfied himself that for the same individual, and with an object of the same brightness, irradiation varies considerably from one day to another.

In the third place, it is well established that irradiation increases with the brightness of the object, and, again, the hypothesis of a propagation of the impression on the retina renders the most satisfactory reason for this fact; for it will not be disputed that the more energetic the excitation, the greater will be the distance to which it is propagated. But observation further demonstrates that the augmentation does not increase proportionally to the brightness; that its progress is much less rapid. For example, the angular diameters of the sun and moon being little different from one another, the brightness of the solar disk must be to that of the disk of the moon very nearly in the same ratio of intensity as the light which reaches us from these two bodies. But the brightness of the solar disk is nearly a thousand times that of the disk of the moon. If irradiation, then, increased proportionably with the brightness of the object, that which the sun developed would be enormous relatively to that of the moon, and the first of these orbs would present to the naked eye the aspect of an immense globe. The aspect really presented to us by the disk of the sun compels us, therefore, to admit that irradiation augments much less rapidly than the brightness of the object which produces it. Hence it follows that if the law which connects these two quantities be represented by a curve having for abscissæ the brightness, and for ordinates the corresponding irradiation, this curve will turn its concavity towards the axis of the abscissæ; and as the increase of irradiation, at first very considerable when we commence with a feeble brightness, becomes at last insensible when the brightness attains a certain limit, the curve in question will have an asymptote parallel to the axis of the abscissæ.

M. Plateau has sought to verify these conclusions by direct experiment, and to obtain the outline of the curve in question. To do so there was but one condition very difficult to fulfil—that, namely, of giving to the object successive degrees of brightness, at once determinate and having a known ratio with one another. This he accomplished in a very simple manner by taking advantage of a principle of photometry which we shall examine when considering the measurement of the intensities of light.

It remained to appreciate the influence exerted on irradiation by the greater

or less illumination of the field surrounding the luminous object. As the disposition of the retina to receive propagated impressions bears, in virtue of the facts and observations above developed, an inverse ratio to the disposition of the same organ to receive direct impressions, we are authorized to believe that when the light acts directly on a portion of the retina, that portion becomes, from this circumstance itself, less apt to receive a propagated impression. Hence it is readily conceived that if the ground itself on which the luminous object is projected conveys to the eye a certain quantity of light, the direct impression which it produces will counteract the irradiation of the border of the object, and so much the more as the brightness of the ground is greater. This being granted, let us imagine an object which is projected on a ground not wholly deprived of light, and suppose that the illumination of that ground is made to increase gradually. The irradiation produced along the outline of the object will go on diminishing until the lustre of the field has become equal to that of the object. This limit being passed, if the former continues to increase, it is evident that the field will then produce, in its turn, an irradiation which will encroach upon the object, and which will consequently be developed in an inverse direction to the former as regards the line which bounds the real contour of that object. The irradiation will have passed, so to say, from positive to negative. This change, which is a direct consequence of the known facts, justifies the assumption that at the instant when the lustre of the field has become equal to that of the object the irradiation of the latter is reduced to zero; and as the effect must be reciprocal, if, instead of an object and surrounding field, two objects be supposed of equal brightness and in contact, the irradiations of these two objects will be null at the point or line where they touch. This result has been verified.

To evince directly the influence exerted by the greater or less illumination of the field, recourse may be had to the following means: We begin by staining with black, for half its length, a rectangular piece of white paper, which is thus divided into two rectangles, one completely dark, the other semi-transparent; this latter half should be oiled for the purpose of increasing its transparence. In this paper we cut with the point of a penknife a longitudinal opening five millimetres in width, of which one half traverses the black, the other the translucent space. We then stretch this paper on a frame, or, what is better, paste it on a pane of glass. When this apparatus is placed against a window, it is apparent that the longitudinal opening will form a luminous band, one half of which is projected on a black ground, and the other on a ground possessing a certain degree of brightness, although much less than that of the band. If we now place ourselves at the distance of some metres, the two halves will appear to be unequal widths, the first seeming considerably to exceed the second.

From the foregoing discussion it results that the hypothesis of the propagation of the impression to the parts adjacent on the retina explains in a satisfactory manner all the laws of irradiation manifested to the naked eye. Unfortunately, adds M. Plateau, when, in order to observe the effects of irradiation, we equip the eye with a lens, a wholly different order of facts is presented. Thus, while a certain apparatus observed with a naked eye and at the distance of distinct vision manifested a very apparent irradiation, the virtual image of the same apparatus, produced by a strong magnifying glass situated at the same distance, and possessing moreover perceptibly the same brightness, exhibits no appreciable irradiation. We are thus led to this singular conclusion, that magnifying glasses appear to possess the faculty of considerably diminishing ocular irradiation. Is not this because the lens, by restricting the luminous pencil without proportionably modifying its brightness, causes it to occupy a smaller space on the retina? M. Plateau does not say so, and does not attempt to explain this peculiarity. With a convergent lens of sufficiently

short focus, irradiation became too small to be perceived. It is evident from this that in astronomic observations the eye-glass of the telescope must exert a decided action upon the irradiation which surrounds the image of a star.

M. Plateau has shown that the modification which irradiation undergoes from the interposition of a lens seems to be controlled by the following laws: First, irradiation is diminished by convergent lenses; this effect, considerable when the focal distance is short, grows weaker as that distance increases, becomes null when the latter is infinite, and changes its sign with it; that is to say, irradiation increases, on the contrary, under the influence of divergent lenses. Secondly, experiments seem to indicate that the action of the lenses seems to depend only on their focal distance, and not on the absolute curvature of their surface.

M. Plateau concludes his admirable memoir, written with the utmost clearness both of reasoning and style, by presenting, under the form of a summary, the following conclusions drawn from the doctrine of irradiation:

I. Ocular irradiation.—1. Irradiation is a well-established fact, easy to verify, very variable, but capable of being measured with precision under all circumstances. 2. It is manifested at all distances from the object which produces it, from the shortest distance of distinct vision to any degree of remoteness whatever. 3. The visual angle which subtends and which measures it is independent of the distance of the object. 4. It follows from this that the absolute breadth which we attribute to it is, all else being equal, proportional to the distance which exists, or which appears to us to exist, between the object and our eyes. 5. Irradiation increases with the brightness of the object, but according to a law much less rapid. If this law be represented by a curve having for abscissæ the successive values of the brightness commencing at zero, and for ordinates the corresponding values of the irradiation, this curve passes by the origin of the co-ordinates, turns its concavity towards the axis of the abscissæ, and presents an asymptote parallel to that axis. The curve is already very near its asymptote for a brightness of the order of that of the northern sky. 6. When the field which surrounds the object is not completely deprived of light, the irradiation of that object is diminished, and the more strongly in proportion as the brightness of the field approximates to an equality with that of the object. If equality takes place, irradiation vanishes. 7. Hence it follows that when two objects of equal brightness adjoin one another, irradiation is null for each of them at the point or line of contact. 8. Two irradiations in presence of and sufficiently near one another, both suffer diminution. This diminution is the more considerable as the borders of the luminous spaces whence the two irradiations emanate are in closer proximity. 9. Irradiation increases with the prolonged contemplation of the object. 10. In the same individual and for an object of the same brightness, the irradiation varies considerably from one day to another. 11. Irradiation is modified when a lens is placed before the eye; it is diminished by convergent lenses, and augmented by divergent lenses. 12. This action of lenses seems to depend only on their focal distance, and not on the absolute curves of their surfaces. It appears the more decided in proportion as the focal distance is shorter. 13. The most probable cause of irradiation seems to be the one now generally admitted, namely, that the excitation produced by the light is propagated on the retina a little beyond the contour of the image. By means of this principle, which is besides sustained by facts, we are able to give a reason for all the laws of irradiation observed with the naked eye; but difficulties are encountered when the action is exerted by lenses.

II. Irradiation observed through astronomical instruments.—14. The error produced in astronomical observations by what has been called in that case irradiation, proceeds from two causes essentially distinct—ocular irradiation and the aberrations of the telescope. 15. The part in that error which is due to

ocular irradiation depends on the enlargement itself, on the brilliancy of the image, and on the eye of the observer. It is, moreover, considerably diminished by the action exercised by the eye-glass of the telescope, as a convergent lens placed before the eye, and this diminution is greater as the eye-glass is more powerful. As regards the eye of the observer, the effect will differ from one person to another, and, for the same person, will vary from one period to another. 16. This same part of the total error vanishes in observations in which a micrometer *à double image* is employed. 17. The other part of the total error which proceeds from the aberrations of the telescope varies, of course, with different instruments; but for the same telescope it may be considered as constant. 18. The effect of irradiation in telescopes, or the total error proceeding both from the ocular irradiation and the aberrations of the instrument, is necessarily variable, since it depends on variable elements; it may be insensible in certain cases, and attain a considerable value in others. 19. It is possible, even with an indifferent telescope and an eye very sensitive to irradiation, to obtain, by help of certain processes, results which may be considered as disengaged from this total error.

Objections of M. Arago and reply of M. Plateau.—On presenting to the Academy of Sciences the able memoir which we have been analyzing, M. Arago developed various considerations which led him to dissent from the physical explanation which the accomplished professor of Ghent has given of his experiments. M. Arago also recurred to the observations made twenty-five years before by himself in order to ascertain whether the measurements of the planetary diameters, taken with his telescope *à double image*, were affected by any irradiation; he spoke of the influence which it would seem that diaphragms placed before the object-glass might exert over measurements of this kind, since they augment so sensibly the diameter of the stars. He announced, in fine, the early publication of a memoir in which he would take occasion minutely to record the result of researches which, on the one hand, touch upon physiology, and, on the other, connect themselves with several of the most important questions of astronomical science. This promise was made in 1839; but the memoir never appeared. The following is the decisive reply of M. Plateau, as entered in the proceedings, to the objections of the distinguished secretary of the Academy:

“In the session of the 6th of May last M. Arago occupied the attention of the Academy with my memoir on irradiation, and presented at the same time some observations on the theoretical part of the work. He thought that the physiological explanation which I had sought to establish could not be maintained, and advanced a new theory, according to which irradiation is the result of the chromatic aberration of the eye. M. Arago's reasonings not having been printed, I am but imperfectly informed of them, and do not know how far they tend to refute the arguments which I have adduced in favor of the physiological theory. I shall therefore not repeat those arguments, but shall confine myself to an examination of the new hypothesis presented by M. Arago.

“It is true that physicists do not now recognize the eye as a perfectly achromatic instrument, and from this non-achromatism it necessarily follows that the images of objects on the retina are surrounded with a small band of aberration, which must slightly augment the apparent dimensions of luminous objects projected on a dark ground, and diminish that of dark objects projected on a luminous ground. But is this effect perceptible under ordinary circumstances, and has the small band of aberration sufficient breadth to allow us to distinguish it, and to attribute to it the known phenomenon of irradiation? This is the question, and one, I think, capable of solution.

“Let it first be remarked that by virtue of the very cause which produces it the small band which the chromatic aberration of the eye generates around images cannot be devoid of colors. Consequently, if the irradiation manifested

by a white object on a black ground is due to this cause, it would seem that the object must appear colored on its borders. Now, among all the observers who have occupied themselves with ocular irradiation, not one has made mention of colored appearances, and in the numerous experiments which I have made on irradiation, under a multitude of different circumstances, I have never perceived anything of the kind. This absence of visible colors can scarcely be attributed to the small angular breadth of the irradiation; those in whom the phenomenon has much development will be easily able to satisfy themselves by repeating some of my experiments, or by observing the well-known appearance of the crescent moon, that the band of irradiation is of quite sufficient breadth to enable them to see these colors, if any existed.

“In the second place, I see not how it would be easy to explain by this aberration of refrangibility that singular law to which irradiation is subjected, namely, that when two objects of equal brightness are separated only by a small interval, each of them diminishes the irradiation of the other in the parts opposite, and this the more strongly in proportion as the two objects are nearer to one another, so that when at last they touch, irradiation is null for each of them at the point of contact. How shall we admit an action exerted by a luminous image on the aberration produced around another image?

“But we can easily decide by direct experiments whether ocular irradiation is or is not due to chromatic aberration. For this it will be sufficient to ascertain whether irradiation is still produced when the object is illuminated by a homogeneous light. If, in this case, irradiation is no longer perceived, we shall be bound to admit as true the hypothesis which attributes the phenomenon to the chromatic aberration of the eye; but if, on the contrary, irradiation still manifests itself, and to the same degree as with a compound light equal in brightness to the homogeneous light employed, it becomes impossible to seek in the aberration in question the cause of the phenomenon. Now, I have executed these experiments by the process which I here indicate.

“The homogeneous light of which I have made use is that yielded by the flame of a mixture of alcohol, water, and salt. With this mixture I saturated a parcel of cotton wick, which I placed behind a roughened glass arranged vertically. The mixture, kindled in the dark, yielded me a voluminous flame, and the glass observed from the other side formed a luminous field of sufficient brightness. To render the light still more homogeneous, I interposed between the flame and the roughened glass a yellow glass of an intense color. Everything being thus prepared, I placed successively before the roughened glass the open-worked apparatus described in § 28 of my memoir, and that which has served for my experiments of measurement, after having brought, in the latter, the vertical edge of the movable plate into prolongation with that of the fixed plate. The two pieces of apparatus were thus projected on a field having considerable brightness and receiving a light so closely approaching homogeneity that on observing them by refraction through a prism placed vertically at a distance of five metres, their images not only preserved great distinctness, but presented laterally only a greenish shade so slight that much attention was needed to perceive it. I should not forget to say that, in order to give to the eyes more sensibility, the experiments were not made by day in a darkened chamber, but at night.

“Now, under the circumstances just described, and which would necessarily exclude the effects which might have depended on the aberration of refrangibility, the above apparatus exhibited to me a highly developed irradiation. The same result manifested itself to MM. Burggræve and Le François, who had assisted me in the experiments of measurement reported in my memoir, and who are consequently accustomed to judge of the phenomena of irradiation. In order afterwards to compare the effects produced with those to which a compound light of similar brightness would give rise, I placed at the side of the same roughened glass another like it, behind which I so arranged several lighted candles as to

illuminate it in a uniform manner and throw a light on the second mirror equal to that of the first. An opaque screen served to separate the candles and the flame of the alcohol in order that each of the mirrors should receive but one of the two lights. I had thus two luminous fields of the same brightness, one of which, however, was illuminated by a homogeneous yellow light, and the other by a light which, without being white as that of day, was still composite enough for the case in question.

"I then placed before these two luminous fields identically similar apparatus of irradiation, so that, by observing them simultaneously, it was easy to see whether the irradiations developed by the two lights sensibly differed. Now, this comparison, made by the two persons above named and myself, showed us no appreciable difference; each apparatus manifested a decided irradiation, but that which proceeded from the compound light had neither more nor less extent than that produced by the homogeneous light.

"These facts seem to me to lead unavoidably to these conclusions: that if the aberration of refrangibility in the eye must needs be admitted, irradiation should be attributed to some other cause, and that the effect of aberration must be considered as entirely masked, under ordinary circumstances, by the band of irradiation."

This vindication by M. Plateau has remained unanswered.

Colors produced in the eye by pressure or other indirect causes.—It is not light alone which produces in our eye a luminous sensation. It is well known that irritation, of whatever nature, which affects the retina occasions an impression of light. Compress, for instance, the jugular veins, and, however profound the surrounding darkness, flashes and luminous rays will seem to glance before the eyes. Under numerous and common circumstances the most varied colors appear to us without the agency of external light. The chief accidental causes of the production of these colors are:

1. *Mechanical irritation or pressure.*—A slight compression applied to the external angle of one eye produces a yellow spot in the same angle of the other eye if it is closed, and a blue spot if it is open; every one can easily make experiment of this. Newton had remarked that a weak pressure with the finger on the globe of the eye or blow on that organ produced the sensation of color; these colors he thought vanished instantly when the finger remained unmoved, but Brewster has proved that they continue as long as the pressure is maintained. He has shown also that when the eye is pressed so as to compress lightly the pulpy substance of the retina a circular spot of colorless light is produced, although the eye be in complete darkness and has not for hours been exposed to the light. If the eye is then illuminated it will be found that the compressed part of the retina is more sensible to the light than any other part, and seems in consequence more luminous. A slight compression of the retina, therefore, augments the sensibility for the light it receives, and gives rise to a sensation of light. On the contrary, adds M. Brewster, when the retina is dilated under the influence of light, it experiences an absolute blindness or becomes insensible to luminous impressions. These properties of the retina often evince themselves spontaneously, with different modifications, in consequence of the movement of the eye by its own muscles. Pressure, when it is too feeble to produce a luminous impression, may modify other impressions first produced on the retina. If, after having been directed toward the sun, the eye sees a reddish brown spectrum, pressure on another part of the retina will cause a change of the spectrum to green, and the brown will reappear when the pressure has ceased.

When pressure is applied at the same time to both eyes, the luminous appearances become remarkable in another way, and particularly in then affecting a regular form, which seems to be the same in all persons. If, for example, pressure be exerted on both eyes in opposite directions, whether to separate them or bring them closer together, there will first be perceived a bluish red light; then,

at the end of some instants, a light of yellowish white tint. Almost at the same time this light will be separated as into small lozenges, which will distribute themselves regularly upon a fasciculus of right lines converging towards the same centre, and which do not appear to deviate by more than 45° on each side from the perpendicular to the right line which passes by the centres of the two eyes. The fasciculus of right lines shows itself but for an instant and appears to be transformed into hyperbolas, all having for a common axis the perpendicular just spoken of, and common foci wherein are seated two uniform and reddish spots; these foci then swerve aside and the groundwork of the brilliant tableau assumes an undulatory appearance. When the pressure has ceased or is relaxed there is no longer anything perceived except a black spot surrounded with yellowish light and covered with red and yellow filaments, which vibrate with great rapidity. When the eyes are kept covered, this spot and the circle which surrounds it take in the end a uniform yellowish tint, which long persists and vanishes gradually. This phenomenon is rarely seen with all the circumstances we have described, because some practice is necessary to produce and to observe it, and the pressure on the eyes, which is quite painful, must be sufficiently strong.

2. *Electricity*.—The galvanic commotion produces not only a species of flash before the eyes, but the sensation of different colors, according to the different application of the electric poles. When the zinc or positive pole is placed in the mouth, and the copper or negative pole in the middle of the forehead, the eye receives the impression of a spot of violet color; if the poles be changed the spot becomes yellow.

3. *Imagination*.—This, in certain persons, acts in such a manner upon the organ of vision that if they represent to themselves any object, that object is instantly displayed before their eyes with its natural color and form. Goëthe assures us that when he closed his eyes and thought of any flower it immediately presented itself before him. Whenever Newton, after the experiment of which we have spoken, thought of the sun, that orb appeared to him at the instant, even in the midst of the most profound darkness. After the lapse of years he would have been able, had he chosen to encounter the risk, to reproduce at will, by the power of his imagination, the sensations which he had before experienced.

4. *Internal causes*.—Sensations of color are also evoked by congestion of the blood, lymphatic irritation of the eye, inflammation, &c. In these particular cases of indisposition the pressure of the blood vessels on the retina produces floating masses of light visible in the dark; first of pale blue, then green, then yellow, and sometimes even of red. All these colors are occasionally seen on the borders of the luminous mass.

Undulations excited in the retina by the action of luminous points and lines.—The following observations we owe to Sir D. Brewster: If we look through a narrow opening of about a demi-millimetre towards a bright portion of the sky or the flame of a candle, the luminous background will be seen covered with a great number of broken parallel lines, alternately lustrous and obscure. These lines are always parallel to the narrow cleft, and naturally change their place while the cleft is turned circularly before the eye. Through a certain number of parallel clefts, as through the teeth of a comb, the parallel broken lines are seen more distinctly, and, if an oblique motion be given to the comb in the direction of its teeth, the broken lines become still more distinct, although not so straight as at first, and we see new black lines placed in different directions, as if they were detached portions of a great number of dark ramifications. All these phenomena are better seen by employing homogeneous light. If we take two systems of narrow clefts and cross them under different angles, we shall see two systems of broken lines crossing each other under the same angles; and if, when the lines of the two systems are parallel, we give to one of them a

rapid and alternating movement, perpendicularly to the direction of its clefts, the broken parallels will be perceived with particular distinctness.

Phenomena analogous to those just described may be seen by observing black and parallel lines traced on white paper, like those which represent the sea on an engraved chart, or by looking at the sky through the luminous intervals left between parallel threads. If the eye observes these objects fixedly and continuously, the black lines soon lose their straight direction and their parallelism, and present luminous spaces circumscribed nearly like rings of a certain number of links. When this change takes place, the eye which observes it feels a sensation of uneasiness—an effect which is produced also in the closed eye. When this dazzling effect supervenes the luminous spaces between the broken lines become colored, some with yellow, others with blue and green.

The phenomena produced in these two experiments pertain naturally to *rectilinear undulations propagated on the retina*, and the interference and crossing of the undulations, in consequence of which the black lines are broken into detached portions and the colors are produced, spring from the want of fixedness in the head and hand, which causes a parallelism in the successive undulations.

The action on the retina of small and dilating luminous points produces very interesting phenomena. If we observe the sun through a small opening situated at a great distance from the eye, or the small image of the sun formed by a convex lens or a concave mirror, or seen on a convex surface, the light which falls on the retina does not form a clear and definite image of the luminous point, but emits in all directions an infinity of rays which cover, in certain cases, almost the whole retina. These rays are extremely brilliant and sometimes accompanied by colors of singular variety and beauty. The glittering point propagates around itself circular undulations which are broken and colored by interference, and which, being in constant movement from the centre of the retina in all directions, occasion the irradiations above indicated. This curious phenomenon appears in all its splendor when we look at the luminous centre which results from the ignition of a jet of oxygen and hydrogen gas on a piece of chalk, or the combustion of points of charcoal at the poles of a strong battery. How often have we contemplated with surprise this circular zone of sparkling rays which appear under the form of discontinuous right lines scattered at equal distances from points by turns excessively brilliant and obscure.

If we observe through a narrow opening the luminous centres just described, a very singular effect is produced. A vortex of circular rays exhibits itself on each side of the brilliant point, having a rapid rotary movement. This remarkable configuration of the rays is evidently produced by the union of a system of parallel undulations with a system of spherical or circular waves; the intersections of the parallel fringes and divergent irradiations form the circular rays as in the case of ordinary caustics. All these phenomena, adds Sir D. Brewster, whatever be their true cause, evidently show that the light which falls on the retina exerts an action even on the parts which do not receive it directly, and that the same action renders other parts of the retina insensible to the light which actually falls upon them.

M. Pécelet also has made an observation not less curious. If the sky be observed through a fissure half a millimetre in width dark stripes will be perceived irregularly distributed in the opening, but always in the same manner, whatever may be the size, form, and nature of the illuminating body; they do not change even when this body is sufficiently slender to yield fringes by diffraction; and when the opening is covered by a colored glass, the stripes seen through the glass are on the prolongation of those which are formed in the free part of the fissure. These stripes change place and become weaker when the width of the opening is increased; beyond a millimetre only very indistinct ones are perceptible near the borders. If the fissure is more remote, the stripes become less numerous, and entirely disappear at the distance of distinct vision. When a

narrow fissure is before the eyes, and either the fissure or the head is inclined, the stripes change their place and arrangement. From these facts it seems evidently to result that the stripes in question are formed in the eye. Their origin may be satisfactorily explained by admitting that there exists in the organ a certain number of obscure points of very small diameter; for each luminous point of the fissure will project on the retina a shadow of that point, and the series of shadows projected by the different points of the fissure form a dark line which will be parallel to it; this hypothesis meets all the requirements of the phenomenon. The accuracy of this explanation is confirmed, moreover, by decisive experiments. Let a plate of glass, on which has been made with India ink a very small black point, be placed between the eye and a narrow fissure, and a dark stripe will be seen parallel to the fissure. If the sky be observed through a narrow fissure whose length we can at will diminish by means of a movable plate whose edge is perpendicular to its direction, when the orifice has a length which differs little from the width, we shall perceive a circular field strewn with dark points, always disposed in the same manner in regard to the eye; and by the elongation of the fissure each dark point produces a stripe. As to the nature of the dark points of the eye, M. Péclet thinks that they proceed from the mammillated structure of the transparent cornea, or from the envelope of the aqueous humor; for each little mammilla will act as a lens of short focus; the light which traverses them will be dispersed in a very open cone; and each of them will cast upon the retina a shadow like an opaque body.

We must seek in the stripes of M. Péclet the explanation of an illusion by which M. Zantedeschi has allowed himself to be deceived. This Italian physicist has announced to the learned world, as a discovery worthy of attention and one which had escaped the penetrating eye of Fraunhofer, the presence in the solar spectrum of bands not transversal, but longitudinal or parallel to the lengthwise dimensions of the spectrum. Had they existed as an integral part of the spectrum, equally with the bands of Fraunhofer, these new dark bands would have been wholly inexplicable, or rather unintelligible. They are fortunately but an extrinsic peculiarity; they doubtless proceed either from the particles of dust inseparable from the edges of the fissure, or perhaps from the dark globules of the eye.

There remains to be noticed a singular fact observed by M. Libri. If a black and vertical line of little length be traced on a white wall, and we station ourselves at a little distance from this wall, a distance which will vary, for the same observer, with the width of the line, the quantity of reflected light, &c.; if, further, after having closed one eye, a very slender thread be placed near the other, so that in looking at the wall and the line there traced, the image of the thread shall seem to cut this line obliquely, the thread will appear, at the point of intersection, to be divided, so to say, into two parts, one of which will be elevated parallel to its first direction, and the other will be lowered. These parts will leave between their corresponding extremities a small void space, which will be precisely the place that the true image ought to occupy. It should be observed that the superior part will always appear lowered, and the inferior part, on the contrary, will appear above its real height. If the obliquity of the thread be diminished, and little by little its projection be brought to cut perpendicularly the line traced on the wall, the two extremities of the images will be seen gradually to approach each other, and then to form a single thread; and finally the same appearances will present themselves in an inverse direction, when by continuing to make the thread turn, we render it again oblique in a position opposite to the first.

On processes to render visible the ramifications of the retina.—The following experiment has facilitated, in a physiological point of view, the explanation of a certain number of facts; we owe it to Professor Purkinje, of Breslau: If a lighted candle be held before the eye, at the distance of about a foot, in a direc-

tion a little deviating from the line of distinct vision, the eye perceives, in general, a mass of reddish light around the candle, and, in this light, as on a background, may be seen the ramifications of the sanguineous vessels of the retina, the base of the optic nerve and the *foramen centrale*.

Sir D. Brewster holds it to be the better opinion that the light which surrounds the candle is reflected on the retina by the inner concave surface, whether of the crystalline or the cornea, and that the objects are, in one way or another, amplified by the concave surfaces. His own opinion on the subject is that the light is propagated from the luminous image of the candle, and that the retina, in contact with the blood-vessels, is insensible to the propagated light, although sensible to the direct light; and consequently the blood-vessels would be delineated in dark lines. As the retina does not extend over the *foramen centrale*, it would at this point naturally present a black spot, and, as to the confused vision of the optic nerve, the latter appears less luminous than the surrounding retina.

M. Wheatstone, who has varied this experiment in different ways, says that it succeeds best in a dark chamber. When, one of the eyes being withdrawn from the action of the light, the flame of a candle is placed beside the unshielded eye, so as not to occupy the least of the central part of the field of vision, then, so long as the candle is at rest, nothing is observed but a diminution of the sensibility of the retina for the light; but when the flame is moved, by raising or lowering it within a small limit, for a space of time which varies with the sensibility of the individual on whom the experiment is tried, the phenomenon presents itself spontaneously. The blood-vessels of the retina, with all their ramifications, exactly as they are represented in the plates of Sömmering, distinctly show themselves, and are projected apparently on a plane before the eye, with amplified dimensions. The image continues manifest only while the light is in motion, and disappears immediately or soon after it has passed to a state of rest.

M. Wheatstone does not accept the ingenious explanation of this appearance offered by Sir D. Brewster; he thinks there is no difficulty in accounting for the image; that it is evidently the shadow resulting from the obstruction of the light by the blood-vessels spread over the retina. The real difficulty was in explaining why this shadow is not always visible. To account for this, M. Wheatstone advances different facts which tend to prove that *an object more or less brilliant than the ground on which it is placed, becomes invisible when it is continually presented to the same point of the retina, and the rapidity of its disappearance is so much the greater as the difference of the luminous intensities between the object and the background is less; but, by changing continually the place of the image of the object on the retina, or by causing it to act intermittently on the same point, the object may be rendered visible in a permanent manner.*

Applying this explanation to the phenomenon in question, M. Wheatstone observes that every time the flame of the candle changes its place, the shadows of the vessels fall on different points of the retina, which is evident from the movement of the image while the eye remains at rest, a movement which is always in a contrary direction to that of the flame: hence the shadow, by thus changing its place on the retina, remains, according to the law previously established, visible in a permanent manner; but when the flame is at rest, the shadow also is at rest, and consequently disappears.

M. Wheatstone has contrived an instrument for showing a singular modification of this experiment. It consists of a circular concave plate of metal, about two inches in diameter, blackened on the exterior face, and perforated at its centre with a hole nearly equal to the bore of a light gun; on the interior face is fixed a similar concave plate of roughened glass. By placing the opening between the eye and the flame of a candle and setting the plate in motion, so as continually to displace the image of the opening upon the retina, the blood-vessels will be seen

as before, but in a brighter manner, and the spaces between the ramifications exhibit an innumerable quantity of small vessels, which anastomose in different directions, and which were invisible in the preceding experiment. At the very centre of the field of vision there is a small circular space in which no trace of vessels is seen.

M. Melloni on the coloring of the retina and the crystalline.—According to the theory which we have long developed and defended, vision is the result of extremely rapid vibrations excited in the retina by a certain series of ethereal undulations. The vibrations will depend less on the quantity of movement than on the particular disposition of the retina which renders it apt to vibrate with more or less facility, in unison with such or such an ethereal vibration; this, in terms of acoustics, would be a sort of resonance, proceeding from the accord or harmonic relation established between the tension of the molecular groups of the retina and the period of undulation of the incident ray. Those undulations, which are between the yellow and the orange, which correspond, as Fraunhofer has proved, to the maximum of luminous intensity, will better harmonize with the constitution of the retina, and will communicate to the molecules a more intense vibratory movement. The quantity of light perceived would depend on the intensity of the molecular vibrations, and the color on the number of the vibrations. By assuming that the red and violet undulations find in the retina a less perfect consonance than the yellow undulations, it will be readily comprehended that the former give a less quantity of light. This hypothesis is the more plausible, inasmuch as, followed to its final consequences, it leads to a very happy explanation of the obscure radiations, *chemical* or *calorific*, situated outside of the solar spectrum, radiations endowed, as will be shown further on, with all the properties of luminous rays, visibility excepted.

It must needs, then, be admitted that the ethereal undulations of different colored bands of the spectrum have a different aptitude for exciting the vibrations of the retina, and that the maximum of effect pertains to the yellow.

It has been shown that the substances which vibrate with the same facility under the action of luminous undulations of any length whatever are white; colored substances, on the contrary, are those which vibrate with more intensity under the influence of one or of several species of luminous undulations, while showing themselves less sensible to others. Now, it is a constant fact that the yellow undulations produce by *consonance* the *maximum* of effect on the retina. The retina, then, must be yellow, and not colorless, as has been thought till now. This conclusion rests on a perfect analogy of luminous properties between the retina and the different bodies of nature. It may be conceived, however, that the vital force might communicate to the retina, even if white, a degree of excitability more in unison with the color of yellow. To decide, therefore, this question of the color of the retina, appeal must of necessity be had to observation, and this has been done by M. Melloni.

We must presume, he says, that no observer sufficiently experienced has examined with attention this precious membrane; for, otherwise, he would certainly have recognized that it possesses a yellow tint very distinguishable. If we attentively observe a section of the retina, it will be seen that its thickness increases from the borders to the centre, occupied by the yellow spot of Sömmering, or rather of Buzzi, an Italian physician, who discovered it in 1782. Nor is it the central and thickest part of the retina alone which is and which exhibits a yellow tint to the eye, whether naked or equipped with a microscope; it is the entire retina, and if near the border the color is no longer distinct, it is solely on account of the excessive thinness of the membrane. The yellow color, indeed, cannot be mistaken when the retina is observed under an oblique incidence, or when the thin portions are folded upon themselves. In the eye of a man dead with the symptoms of very intense jaundice, the whole retina had a

most decided tint, and the central spot had acquired an extraordinary vivacity of coloration.

The yellow of the central spot, which in our view constitutes the natural color of the retina, fades and disappears as age advances—an observation which M. Melloni has not found reported in any treatise on physics. It presents itself, however, in a very marked manner on a comparison of retinas taken at different epochs of life. From the change of color in the retina there would necessarily result an alteration in regard to the perception of the elementary rays; but, by one of those innumerable provisions which surprise us at every step in the science of the development of organized beings, nature has taken measures to repair the effects of this disorder. The crystalline is perfectly limpid and colorless up to the age of twenty-five or thirty years; but this period having passed, we see it assume a very slight tint of straw-colored yellow, which is developed at first on the central part, afterwards attains the borders, augments progressively in value, and finally becomes, in aged persons of seventy-five or eighty years, quite as decided as the color of yellow amber. If we consider the effect produced upon the sight by this new development of color, it will be at once comprehended that the yellow acquired by the crystalline is destined to repair the loss of that tint in the retina. To show that the sum of the two variations really compensate for one another, M. Melloni procured a number of eyes of very different ages, and, having extracted the crystallines, he placed the latter on the central parts of the corresponding retinas; all the systems were thus found to present the same shade of yellow. The experiment carried to the two opposite limits is one of great interest; for in early youth the coloration, which is not yet developed in the crystalline, is amply manifested on the retina, while in decrepitude it has entirely retreated to the crystalline, leaving no trace of itself on the retina. The aged crystalline placed beside the young retina presents the same tint, notwithstanding the vast difference of constitution.

The appearance and progress of the yellow tint in the crystalline constitutes, therefore, a true process of what might be called *attuning*, put in operation by nature for the purpose of maintaining at the same luminous pitch the instrument of vision. It can thus be understood why white continues to be white for our eyes at all the epochs of life, notwithstanding the increasing coloration of the crystalline and the interposition of a yellow medium between external objects and the retina.

DALTONISM, OR INNATE IMPERFECTIONS IN THE PERCEPTION OF COLORS.

Definition.—There are persons whose eyes are incapable of distinguishing colors. They readily perceive the form of objects, distinguish light from darkness, appreciating the slightest differences; but they mistake certain colors. Their retina, insensible for some tints, cannot transmit their impression to the brain. The number of such persons is much more considerable than is generally thought. Of forty youths who pursued the higher studies of the gymnasium at Dresden, M. Seebeck found five to be daltonians, some of whom, however, were without consciousness of their infirmity. One of the singular features of the defect is that it is often hereditary. Three remarkable memoirs—published, one, in 1837, by M. Seebeck, jr.; the second, at Geneva, by M. Elie Wartman; the third, at Paris, by M. Victor Zokalski, in 1841—seem to embrace all that relates to this difficult question, and to the analysis of these we propose to devote a few pages.

Observations.—As all researches on the subject set out with the observations made by Dalton on himself, an account of which he inserted in the memoirs of the Literary Society of Manchester, we shall give substantially a transcription of it: “I had always thought,” says Dalton, “that their true name was often not applied to colors. *Violet*, to designate the flower of that color, seemed, of course, proper; but if the term *red* were substituted, this license appeared to

me neither just nor natural. *Blue*, to be sure, might be permitted to replace the word *violet*, for these two colors appear to me closely analogous, while red and violet bear no relation to one another. When pursuing my scientific studies I gave particular attention to optics. The theory of light and of colors was familiar to me before I had discovered the defect of my vision, a defect which I had always attributed to the confusion prevailing in the terminology of colors. In the course of the year 1790 I occupied myself with botany, and this study involved a particular notice of colors. White, yellow, or green I called without hesitation by its proper name; while for me there was little difference between purple, violet, and crimson. I would often ask my friends which color was blue and which violet; but the inquiry was taken for a pleasantry and answered slightly. Meanwhile the peculiarity of my vision was not clearly known to myself till the autumn of 1792. I was one day examining the flower of the *geranium zonale* by the light of a candle. This flower, which by daylight appears to me blue, and which is, in fact, violet, now seemed entirely changed. The supposed blue color had wholly disappeared and given place to red, which is for me the exact opposite of blue. I doubted not that this change occurred to every one, and asked some of my friends if it were so. Judge of my surprise when I learned that no one, except my brother, saw as I did. This observation taught me that my vision, as well as my brother's, differed from that of the rest of the world, and that artificial light produced to us changes of color which were not perceived by other persons.

"Two years passed before I applied myself to serious inquiry on the subject; at the end of which time I availed myself of the services of a friend profoundly skilled in the theory of colors, their distinctions, and constitution. I am near-sighted, and the eye-glasses which suit me best are of five-inch focus. I see well at a convenient distance; but when the weather is obscure or too bright I distinguish with difficulty. It was on the solar spectrum that I commenced my observations; six colors are there universally recognized: red, orange, yellow, green, blue, and purple, which last Newton divided into two others, indigo and violet. As for myself, I recognize in the spectrum but two, or at most perhaps three colors—the yellow, the blue, and the purple. My yellow comprises the red, orange, yellow, and green of all the world; my blue is so confounded with the purple that I hardly discern them to be other than one and the same color. The part of the spectrum which is called red seems to me scarcely anything else but a shadow or an absence of light. The yellow, orange, and green are, for me, the same color with different degrees of intensity. The point of the spectrum at which the green touches the blue presents to me a highly striking contrast and a most decided difference. The distinction of blue and purple is far from being so marked; for the purple, in my estimate, is but a mixture of blue and shadow. When I look at the flame of a candle through a prism, nearly the same phenomena present themselves; yet the red seems more lively than that of the solar spectrum. The following is a statement of the manner in which each color is presented to me, whether by solar or by artificial light:

"*Red*: By daylight I comprise under this name crimson, scarlet, red, and violet. Crimson resembles blue with which has been mingled a shade of deep brown, its varieties not being so different as to be distinguishable. This color appears to me grave in the presence of bright colors. Blue cloth and crimson offer me no decided difference. Violet is composed of red and blue, but it produces no other impression on me than that of a pale and faint blue; if placed beside bright blue it seems the same color, only somewhat tarnished. I regard as blue the rose, the violet, the common clover, and several kinds of geranium. A spot of common ink on white paper is, for me, of the same color with the cheek of a person glowing with health. The red and scarlet form an entirely different class from the preceding colors; I perceive in them not the least trace of blue; the scarlet is rather brighter than the red. Blood, in my view, has a

deep bottle-green color. By candle-light red and scarlet become more brilliant and vivid. These two colors, which by day present a deep cineritious gray, assume a strange brilliancy under an artificial light. Crimson loses its blue and changes into a yellowish green. But it is the violet which changes most, and presents the greatest difference when seen by day or by candle-light; here there is no longer a trace of blue, but it seems to be composed of yellow and red, as by day it is composed of red and blue. As to yellow and orange, my vision is absolutely the same with that of all the world, as seen by day or by artificial light.

"*Green* by daylight: I am certain that of this color I have a peculiar idea; it seems to me but little different from red. In order to recognize in it a peculiar tint I in vain place a bay leaf beside a stick of sealing-wax: hence it may be safely inferred that I see green or red, or both colors, differently from the rest of the world. Orange and bright green appear to me to have much resemblance. The green most agreeable to me is that which is very deep, and it becomes the more distinct as it verges upon yellow. I recognize plants as well as another, and am able, like others, to appreciate their differences or resemblances. Nevertheless, an infusion of tea, or a solution of liver of sulphur, whatever they may be to others, are green for me; the green cloth which covers some tables appears to me brown and soiled, and I am persuaded that a mixture of brown and red would, to my eyes, well replace that color; but when such cloth begins to grow old and becomes yellow to others, then only does it assume for me a green tint. Like all the world, I find a difficulty in distinguishing green by artificial light, which for me, as for others, then closely approaches to blue. In all these cases I have been satisfied by numerous trials that my brother sees just like myself, and therefore differently from all other persons.

"Persuaded that cases of this kind could not fail to be of interest to inquisitive minds, I was preparing to publish a statement of the peculiarities of my vision, when I remembered having read in the *Philosophical Transactions* some account of a mariner of Maryport, named Harris, who, it was represented, *could not distinguish between colors*. The case of Harris seeming somewhat different from my own, I thought that a comparison might cast some light on the nature of our imperfection, and wrote to obtain exact details on the subject; the information received convinced me that the defects of vision in the two cases were not absolutely parallel, and this suspicion was confirmed on my sending at least twenty specimens of colored riband to Maryport, with a request that they might be submitted to the inspection of Harris both by solar and artificial light. Subsequent observation has satisfied me that cases of this nature are by no means so rare as we might suppose them to be; in carefully studying the vision of persons of my acquaintance I have found more than twenty who might be ranged in the same category with myself; one or two differed only a little from the others. Among twenty-five pupils to whom I was one day endeavoring to explain this subject, there were found to be two affected in a similar manner; and, another day, one in the same number of auditors. Among all these persons my brother and I alone could not distinguish blue from violet by daylight, while, by candle-light we both recognized a great difference between these colors. With regard to green, all the persons spoken of had perceptions precisely like our own. As has been said, however, I have observed some twenty persons whose vision was similar to mine, but I have never heard of any woman who was affected with the visual imperfection of which we are speaking."

A second account, accompanied by details, is to be found in the writings of Sommer, a man of eminence, who describes as follows the infirmity under which he labored:

"The sub-orbital part of my eye is very prominent, and covered with thick blond hairs, which form an arch a little flattened. The folds of the upper eyelids are parallel to the border of the orbit, the lower eyelids thick, and the

lashes somewhat short. The bulb and the cornea are very little arched, and the iris is throughout of a greenish blue, more deeply colored towards the pupillary border, and sprinkled over with yellowish points; the pupil is normal as to size and mobility. On the whole, the eye bears all the characters of a sanguine temperament. My sight, excellent in youth, was much enfeebled through being exerted by artificial light; still I see very well both near and distant objects. Different degrees of intensity of light act upon my vision as upon that of other persons.

"The *muscæ volitantes* which, for some ten years, have floated before my view, alarmed me at first, because I took the phenomenon for a precursor of amaurosis, but its stationary condition soon reassured me. There is no connection, however, between this accident and the imperfection of my sight in regard to the distinction of colors; for, as that imperfection existed from birth, my associates remarked it as well as myself, and I still recall many a laughable adventure to which it gave rise in my childhood.

"I can always distinguish, by daylight, yellow from blue, bright blue from green, deep red from black; the last I very well discriminate from bright colors, but I often confound it with the dark green and blue. Yellow, black, deep blue are for me the fundamental colors. Although I well perceive a difference between the colors often presented to me, yet I could not undertake to designate them by name without risk of committing an error. If I hold beside one another a leaf and a stick of sealing wax, I recognize very clearly the difference of intensity in the two colors, but I could not affirm that one of the objects is green, the other red, if the object itself did not enable me to divine it. Blue, not deep, and red, not intense, have for me a great resemblance. Placed near one another, the bright brown which approaches yellow, green somewhat deep, and red of a decided hue, all seem to me shades of one and the same color. I confound blue with red, green with brown, orange with bright brown, and a multitude of other compound colors. Crimson, purple, lilac, flame color, &c., I know only by name, and it is not possible to convey to me the least idea of them, though of course I have often had these colors before my eyes. In general, I cannot retain colors, and if a series of them were shown me and their names indicated, I should almost certainly be mistaken in recounting them if their positions were altered.

"I remember that on meeting, one day, a lady wearing a blue hat ornamented with roses, I could make no distinction between the hat and the roses, but thought both red. At another time, when walking out, a shower of rain came on, and a multitude of red umbrellas (then in fashion) were raised; to me they all appeared of the same color with the sky. I confound constantly the colors of dress, and of flowers, and there is not a tint which does not recall some ludicrous mistake which it has occasioned me to make. The impositions to which I am thus exposed, the fear of being charged with singularity, cause me to use much reserve in the indication of colors, and to call to my help all the particulars which may enable me to determine their character. Many objects have each a specialty of color, which preserves me from making as many blunders as might be supposed. Thus, usually the garb of a huntsman may safely be called green; nor can one be often deceived in speaking of tiles or flesh as red, or of the sky as blue; but if the least change of color occurs in these objects, my judgment is directly and necessarily at fault. For the few colors which I recognize I possess a good memory and distinct conception. Artificial light, however, confuses for me all tints, and I cannot then venture to indicate colors which I recognize well enough by the light of the sun. The landscape which Goethe caused to be painted without any trace of blue, and which, he maintained, ought to appear entirely proper to an *akyanopist*, had nothing unnatural to me; I should not even have remarked the complete absence of blue had I not been previously apprised of it. The rainbow seems to me composed of blue and yellow; I

perceive, indeed, that there are more than two tints, but I cannot distinguish them, nor even conceive the difference."

Let us cite, as a last example, that of the Harris family, reported by M. Hudart in a letter to the celebrated Priestley:

"Harris, a shoemaker, of Maryport, in Cumberland, could judge without difficulty of the size and form of bodies, but he was without the power of distinguishing their colors. He was well aware that objects offered to the sight of other men something which they readily recognized, though undiscernible to him; that they expressed in words certain qualities of those objects which he could only designate at hazard and with hesitation. It was at the age of seven that he first became apprised of this imperfection. Having found, one day, a child's stocking, he entered a neighboring house to learn to whom it belonged; he observed that every one spoke of it as a red stocking, but as the term had no meaning for him, he regarded it as merely superfluous and thought it enough to call it a stocking. The circumstance remained, however, impressed on his mind, and some similar observations which he afterwards made enlightened him as to the state of his vision.

"The sensation of color being the first we experience, it will appear surprising, no doubt, that he had not sooner discovered what was wanting to his perceptions. But this difficulty will be removed when it is stated that his relatives were Quakers, and that a grave uniformity of colors is generally as strictly observed by this class of persons in their dwellings as in their vesture. Harris discerned objects, whatever their distance, as well as others, when their form sufficed to convey an exact idea; but his vision was at fault as regarded bodies which are only appreciable by the color. His companions could distinguish from afar the *cherries* on a tree, where to him there appeared nothing but *leaves*, and it was only by approaching near enough to judge of the relative form and size that he could discriminate between the foliage and fruit. He was quite capable of distinguishing between black and white or a bright light; and for him the other colors ranged between these two extremes according to their brightness or obscurity. Hence he was often led to confound or comprise under one name very different colors, because to him they presented the same lustre. If a riband was striped with different colors, he did not confound it with a plain one, but he could only perceive in it degrees of light and shade more or less marked.

"Harris was an intelligent man and fond of knowledge, especially that which relates to light and colors. Two of his brothers were born with the same defect as himself, but two other brothers and two sisters were exempt. Having met, in Dublin, with one of his brothers, a mariner, of Maryport, I proposed to examine his vision, and obtained the following results: As I had no prism at command, I asked him if he had ever seen a rainbow; he assured me that he had often observed it, had counted all the colors, but could not call them by name. I presented a riband, in which he recognized several colors and attempted to name that of each of the squares of which it was composed. The white ones he distinguished without hesitation, but he confounded the black with the brown, saying that they were only shades of the same color. When pointed to a *green* square, he replied: 'To me it seems that this is the color which you call yellow.' A red square, with him, was *blue*, and he was confident of seeing *green* when I showed him *orange*. I asked him, finally, whether he thought that what we call *colors* were anything else than degrees of brightness and shade, or whether he believed that there was still some other difference. To this he replied doubtingly, that he imagined he could observe something else, of which, however, he could give no account."

We should exceed our limits if we attempted to present to our readers the observations carefully collected by the authors before cited; a summary account of them will suffice and lead us naturally to a consideration of the theoretical

views, which are more pertinent to our purpose. M. Seebeck has distributed the daltonians into two classes: the first comprises the individuals who are rather mistaken in the degree of the coloring than the nature of the color. The tints which they more or less confound are: the bright orange and pure yellow; the deep orange, the clear yellowish or brownish green and the yellowish brown; the pure clear green, the grayish brown and flesh-color; the rose-colored red and the green rather bluish than yellowish; crimson and deep green and chestnut-brown; bluish green and dull violet; lilac and bluish gray; azure and bluish gray and lilac. Their perception is very defective as regards the specific impression of colors in general, and especially so for red and consequently green, which they discriminate but little or not at all from gray. Yellow is the color of which their appreciation is most correct, although they often see less difference between this color and the appearance of colorless bodies than is discerned by eyes of normal conformation. The second division comprises persons who confound bright orange with greenish yellow, brownish yellow and pure yellow; deep orange with brown yellow and grass green; red and deep olive green; vermilion and deep brown, carmine and blackish green; carnation, grayish brown, and bluish green; dull bluish gray and brownish gray, yellowish rose-color and pure gray, deep rose with lilac, azure and gray passing into lilac; crimson and violet, deep violet and deep blue. They have but a feeble perception of the least refrangible rays; it is in this that their most strikingly distinctive characteristic consists, and on this rests chiefly the distinction between the two classes. It explains not only why the individuals of the second class, like those of the first, confound red with dark green, but will account moreover for all the differences which separate them, if it be remarked that the absence of the orange rays occasions much affinity between blue, colorless light, and even red.

We know that as the obscurity becomes greater the least refrangible rays disappear first from the light of the atmosphere, and that from this more prompt disappearance arise the changes of color observed under such circumstances. If, therefore, the defect of sensibility for these rays characterizes the daltonism of the second class, the daltonians of the first class should find themselves, during the approach of darkness, nearly in the same condition with those of the second. Towards evening, M. Seebeck presented to one of the first class of daltonians two series of colors, of one of which he judged very correctly, while he was constantly mistaken as regarded the other; in proportion as the obscurity increased, the first series betrayed him more and more into error, while the second was better and better appreciated; when the obscurity became considerable, the second series was that on which he was no longer deceived, while he erred completely in regard to the first. He could soon no longer distinguish, like the daltonians of the second class, by the light of day, the blue sky from the rosy red; finally, he judged not more correctly of the colors of the second series: the red paper which, by day, appeared to him too dazzling, then appeared too dark. Subjected to the same tests, the eyes of the daltonians of the second class acted quite differently: the obscurity had at first produced on them no effect; their judgments respecting the second series of colors were invariable; more and more correct, they agreed with those of the first daltonian, especially in the impression that, under the influence of the growing obscurity, the red paper had become darker. Obscurity then reduces to the second class the daltonians of the first; reciprocally, by a bright orange green placed before the eye the daltonians of the second would be reduced to the first class. In these observations M. Seebeck has presented us with some very original views, and has proved himself here, as in all his labors, a profound and skilful physicist.

Classification of Dr. Szokalski.—M. Szokalski comprises under the name *chromato-pseudopsy*—formed from three Greek words *χρῶμα*, color; *ψευδος*,

false; *οφθαλμος*, sight—the phenomena which, with M. Wartmann, we have designated by the more simple term *Daltonism*. He distinguishes five classes of daltonians: 1st. That of persons in whom the sense of color fails almost completely, and who see in place of the principal colors, yellow, red, and blue, only different degrees of white and black. The existence of this class is doubtful, for all eyes have at least the sensation of yellow. 2d. That of persons who distinguish the yellow. To these external objects appear colored with the tints produced by different combinations of yellow, blue, and black. 3d. That of persons who not only see yellow, but are moreover capable of a peculiar and uniform perception of blue and red; these are the *akyanopists* of Göethe. 4th. That of persons only destitute of the perception of red, which appears to them ashy-gray. 5th. That of individuals who distinguish all the colors, but not in a distinct manner: instead of being able to discriminate the mixture of two colors, they see but one of them. These divisions are rather arbitrary than real; they seem to us suggested by an incomplete and hypothetical study of the facts. We should have much confidence in M. Szokalski as a practical oculist, but his pamphlet proves that he is not a competent physicist; it might be said, indeed, that he has undertaken to wrest daltonism completely from the domain of physics. “The immediate cause,” he says, “of chromato-pseudopsia consists in the confusion of the determinative functions of the brain which furnish us with the perception of colors.” This is evidently an error; before the confusion of the functions of the brain—an imaginary confusion probably—there is certainly a physical cause, the insensibility of the retina. M. Szokalski is convinced that the physicists have but false ideas of colors: while they are entirely and essentially subjective, the physicists have made them objective by forgetting the important part which our eye plays in their production. We shall not stop to repel a reproach which has no foundation; there is no physicist who does not admit that *colors are produced in our eyes*; that the sensation of color depends on a certain change in the eye, a change which is caused by the operation of some stimulus. Yet more than this: the different sensations of red, orange, &c., arise necessarily from different stimulants; in each luminous ray, therefore, there is evidently a distinctive character which fits it for determining such or such a sensation, and it would seem then quite natural to attribute to it the color. But we leave these useless discussions and proceed to analyze the much more methodical memoir of M. Elie Wartmann.

Number of Daltonians.—The number is much more considerable than is commonly supposed. M. Seebeck detected five daltonians in rather more than forty youths who composed the two higher classes of a gymnasium in Berlin, and Professor Pierre Prevost has asserted that among twenty individuals there is at least one who is a daltonian.

Characteristic signs.—Are there any means of deciding, from simple inspection of the eye, whether daltonism exists? M. Wartmann hesitates to affirm that in all cases the reply should be negative. It would seem that the daltonians whose eyes are of a hazel brown sometimes offer, under an incidence more or less oblique, a yellow reflection of a peculiar tint, the presence of which may lead us to suspect daltonism. It has been erroneously assumed that there were more daltonians with blue than with black eyes.

Apportionment as to sex.—It can scarcely be doubted that daltonism is much more common in men than women. M. Szokalski having assembled a number of women and showed them separately specimens of variously colored riband, requested each of them to indicate the name and nature of the colors. He was struck with the perfect accord which existed among all their answers. The same trial, made with a certain number of men, was far from yielding the same result. Scarcely were the same specimens shown to them, when a lively discussion arose among them on the names of the colors. The faculty of discern-

ing colors would seem, therefore, to predominate in women. Gall asserts that the organ of color is more developed in woman than in man.

Influence of age and parentage.—Daltonism dates ordinarily from birth. It is often hereditary. It sometimes affects one, two, or more members of a family, while the others remain exempt. It is remarkable that the transmission of daltonism takes place rather through females than males, although females, as we have seen, are themselves very rarely subject to the infirmity. M. Cunier, however, has recently ascertained a case of hereditary daltonism in five consecutive generations, and always in females, who were alone affected.

Explanation of Daltonism.—Some persons will see nothing in this affection but a defect of intelligence or perturbation of the functions of the brain; others assume an abnormal coloration of certain parts of the eye which modifies the true colors; others, again, think that the cause should be sought in the sensibility, more or less great, not only of the retina in general, but specially of the different nervous fibres which vibrate in unison with such or such a color, or which are impressible by such or such a tint. The first opinion we shall not stop to refute. The second was held by Dalton, who concluded from his personal observation that the humors of his own eyes and of those of his students were tinged with blue. He ascribed this peculiar coloring to the vitreous humor; but the researches of anatomists have never brought such coloration to light. Moreover there are observed facts which would be very imperfectly explained on this hypothesis. Persons who habitually use blue glasses are not thereby exposed to a confusion of colors. Göethe, on the other hand, conceived that daltonians were insensible to blue, but saw in its place a pale purple or rose color. This view, however, is evidently inconsistent with facts.

From the sum of the observations heretofore made, two conclusions, we think, may be drawn: 1st, that daltonism never extends to yellow, a color which all eyes are capable of seeing; 2d, that the sensations of two complementary colors are inseparable, in the meaning that the eye is either sensible or insensible to both at the same time. The eye which perceives blue perceives also an orange color. The eye which does not discern red is incapable also of distinguishing green; these two colors it confounds. The above conclusions comprise in themselves all the phenomena of daltonism. They are, moreover, a necessary consequence of the theories of MM. Melloni and Plateau, and might be enunciated *a priori*, even previous to their verification as a consequence of facts. But these conclusions being once admitted, it becomes evident that the cause and explanation of daltonism is to be sought in an anomalous insensibility of the eye, which deprives it of the faculty of vibrating in unison with such or such a luminous ray.

We shall not insist further on this point. Let us conclude by indicating the very simple means by which the elder Seebeck succeeded in rectifying to a certain extent the error committed by daltonians in the appreciation of colors. This means consists in the use of glasses, or more generally of colored mediums. Suppose, for example, that an eye confounds green with red. It will evidently suffice to furnish this eye with a red glass in order that the difference between the two colors shall be distinctly perceived. The surprise of a daltonian is inexpressible when thus enabled to discover the errors which he is constantly making. By this means, however, only mistakes relative to the nature of colors are remedied. The inability to distinguish between shades of the same tint will, in general, still subsist.

The first of these is the fact that the United States is a young nation. It is only about thirty years old, and its history is therefore a history of rapid growth and development. The second fact is that the United States is a large nation. It covers a vast area of land, and its population is one of the largest in the world. The third fact is that the United States is a diverse nation. It is made up of many different peoples, races, and religions, and this diversity has been one of its strengths. The fourth fact is that the United States is a powerful nation. It has a strong economy, a powerful military, and a significant influence on the world stage. The fifth fact is that the United States is a nation of ideals. It is a nation that values freedom, democracy, and the rights of the individual. These five facts are the foundation of the United States, and they have shaped its history and its future.

The history of the United States is a story of exploration, discovery, and settlement. It begins with the first Europeans who came to the Americas in the late fifteenth century. They found a land that was rich in natural resources and full of people who had developed their own cultures and societies. The Europeans came to the Americas for many reasons. Some came to seek wealth, to find gold and silver. Others came to spread their religion, to convert the native peoples to Christianity. Still others came to escape persecution or to start a new life. Whatever their reasons, the Europeans found a land that was different from anything they had ever seen before. They were amazed by the size of the continent, the variety of its landscapes, and the diversity of its people. They began to settle in the Americas, and over the years, the United States grew from a small collection of colonies into a large, powerful nation.

The United States has a long and rich history, and it has many achievements to be proud of. It has been a land of freedom and opportunity, where people have been able to live and work as they see fit. It has been a land of innovation and progress, where new ideas and technologies have been developed. It has been a land of courage and sacrifice, where people have fought for their rights and for the rights of others. The United States is a nation that has made a significant contribution to the world, and it is a nation that we should all be proud of.

THE FIGURES OF EQUILIBRIUM OF A LIQUID MASS WITHDRAWN FROM THE ACTION OF GRAVITY.

BY J. PLATEAU.

[Continued from page 435, Report for 1865.]

SIXTH SERIES.

Theory of liquid films. Laws of films. Constitution of froth. Generation of films. Production of films by frame-work.

§ 1. Let us prosecute the study of liquid films commenced in the second and continued in the fifth series. In § 28 of the second series I regarded the generation of films as being due to a tendency towards a new figure of equilibrium. I now abandon that opinion, at least in part; though still believing that in the case where gravity does not intervene, the system, when the films are once produced, tends towards the new state of equilibrium which I have indicated. I consider the formation of the films itself as a result of the cohesion and viscosity of the liquid.

Let us examine the matter somewhat more closely. We first take a very simple example, that of the film in shape of a spherical cap developed on the surface of a liquid by a bubble of air which has ascended from the interior of the liquid. Let us consider this bubble at the moment when it is within only a few milli-



metres of the surface, (Fig. 10. *) In order that its summit shall traverse the distance $m\ n$ which intervenes, the liquid molecules situated around this little right line must necessarily be driven toward every azimuth at once, in such manner that these molecules shall undergo relative displacements. Let us suppose, for simplification, that the ascen-

sional movement of the bubble of air is uniform, so that, in equal intervals of time, the bubble shall propel, between itself and the upper surface of the liquid, equal quantities of this liquid. Let us further suppose that the liquid has no viscosity. Then, in proportion as the distance $m\ n$ diminishes, the portions of liquid propelled during the above intervals of time will respectively acquire velocities constantly increasing, since they must accomplish their movements in spaces more and more straitened; thus the relative displacements of the liquid molecules are so much the more rapid as the summit of the bubble is nearer attaining the surface. I have supposed the ascensional movement of this bubble to be uniform; but as it is in reality accelerated, its acceleration will contribute to increase the rapidity of the relative displacements in question.

Now, we know that viscosity opposes to the relative displacements of the molecules of liquids a resistance which increases considerably with the velocity of those displacements. If, then, in order to pass to the actual case, we restore to our liquid its viscosity, the resistance to the lateral translation of the liquid molecules around $m\ n$ will continue to augment in proportion as that right line diminishes in length, and will become very great when this line shall have become very short. Hence it necessarily results that when the summit of the bubble has arrived near the surface, the portion of liquid which still separates it therefrom cannot disperse itself with a rapidity equal to that of the ascensional movement of this summit; and, in order that the air which constitutes the bubble shall continue to ascend and pass beyond the level of the liquid, it is evidently necessary either that the liquid shall be rent asunder, or be lifted up. But it can be no longer doubted, after the ingenious researches of MM. Donny† and

* In this figure the bubble is represented a little flattened vertically, which does in fact occur by reason of the resistance of the liquid.

† *Memoires de l'Academie*, tome XVII des *Memoires des Savants Etrangers*. The memoir of M. Donny was presented to the Academy in December, 1843.

Henry,* that the cohesion of liquids is not of the same order with that of solids; it will be understood, therefore, that when the distance $m n$ is so far reduced that its further diminution cannot be effected with a rapidity nearly equal to that of the ascension of the summit of the bubble, the liquid will still present in $m n$ much too great a resistance to the disunion of its molecules to be forced asunder, and that hence it will be lifted up by the bubble under the shape of a film; and as this film, during its generation, is pressed from below upwards by the bubble of air, and adheres by its circumference to the liquid of the vessel, it must be convex towards the exterior. After the film has commenced forming, it must become still more developed: for, incessantly pressed by the bubble of air, it must continue to rise, while the liquid to which its circumference adheres cannot follow it in mass on account of its weight; this liquid must, therefore, remain behind; but, by virtue of the cohesion and viscosity, there can be no rupture between the incipient film and the environing liquid, and the film will simply increase until the action from below upward exerted on the lower part of the bubble of air shall have had its whole effect. Mr. Hagen,† who has sought to prove, contrary to the principle established by Poisson in his *new theory of capillary action*, that the density of the superficial stratum of liquids is greater than that of their interior, cites, in support of his opinion, the fact of the formation of the films in question; but we see that is not at all necessary to resort to such an hypothesis in order to account for this formation.

In § 25 of the first series it was said that when a mass of oil a little less dense than the alcoholic liquid in which it is immersed rises to the surface of the latter, it is at first more or less flattened against that surface, as if encountering resistance in traversing it; that after some time it makes its way through, and then presents a portion of plane surface more or less extended on a level with that of the alcoholic liquid. This phenomenon is now explicable in a natural manner from the considerations which precede: it fares with the sphere of oil as with the bubble of air; it can only make its way to the exterior by disuniting the molecules of the upper stratum of the ambient liquid, but this not growing thin with sufficient rapidity on account of its viscosity, resists a rupture by virtue of its cohesion. Only it is plain that, in this case, the pellicle cannot be elevated above the level.

§ 2. Let us recur to our convex film developed by the ascension of a bubble of air. When it has attained its full development, and hence remains stationary, it should assume (5 series, § 12) one of the figures of equilibrium which would correspond to the surface of a liquid mass without gravity; now this figure, which is formed by an equal action in all azimuths around the vertical axis of the air bubble, must evidently be one of revolution, and, as it is closed on the axis, it can only constitute (IV, § 2) a portion of a sphere. What, now, does theory teach us on the extent of this portion relatively to the complete sphere? As regards molecular action, the superficial stratum of a full liquid mass may, as we know, be assimilated to a stretched membrane; our liquid film, which is obviously reduced to the superficial strata of its two faces, may therefore be likened to a stretched membrane, and consequently has a tendency to occupy the least possible extent. The question, then, if we neglect certain particulars of which I shall presently speak, and which have no sensible influence when the volume of air is somewhat large, is reduced to this: what, for a given volume, is the segment of a sphere whose surface is smallest? This problem is readily solved by calculation, and we thus find that the segment in question is a hemisphere; but we reach the same result still more simply by the following reasoning, for the idea of which I am indebted to M. Lamarle.

Let us conceive any two spherical segments, equal as regards one another, and

* Philosophical Magazine, 1845, vol. xx, p. 541.

† Ueber die Oberflächen der Flüssigkeiten (Ann. de M. Poggendorf, 1846, vol. LXVII, p. 1.)

applied one against the other by their bases. In order that the convex surface of each of them should be the smallest possible with reference to the volume enclosed between itself and the common base, it suffices evidently that the whole convex surface of both segments together should be the smallest possible in relation to the total volume; now, according to a known principle, this last condition will be fulfilled if the two segments constitute together a single sphere, in which case each of the two segments will be a hemisphere. Our liquid film, if it contains a sufficient body of air, ought, therefore, to take the hemispherical form, and this is what common observation verifies.

§ 3. We will advert now to the particulars to which allusion was made a little while ago. In the first place, the liquid of the vessel must be slightly raised by the capillary action on both the exterior and interior face of the laminar figure, as it would be on the two faces of a solid lamina previously moistened with the same liquid and partially immersed; it must, therefore, form a small annular mass with concave meridian surfaces, and this also is confirmed by observation. Hence the border of the liquid film does not rest immediately on the plane surface of the liquid of the vessel, but on the crest of the small annular mass in question. In the second place, it will be perceived from this, that if the enclosed volume of air is so small that the space circumscribed by the border of the film shall have little diameter, the surface of the liquid in this space will be in no part plane, but will present, even in the middle, a concave curvature more or less decided, as in the interior of a tube of small extent. This result is also in accordance with experience, and I have ascertained, by means presently to be indicated, that the central portion of the surface in question ceases to appear plane when the diameter of the film, at the crest of the little annular mass, is less than about two centimetres. In the third place, even with a volume of air great enough for the surface of the liquid, in the space circumscribed by the film, to show itself absolutely plane through nearly its whole extent, this surface must be sunk below the exterior level by the pressure which the film, by reason of its curvature, exerts on the enclosed air, (V, § 21,) and that this is the case may be evinced by the following process:

In a large porcelain dish placed on a table in front of a window pour a stratum of glyceric liquid (V, § 13) about 2 centimetres in depth, and, after having inflated, by means of an earthen pipe, a bubble of the same liquid, deposit it in the middle of the surface of the stratum, when it will at once form a spherical segment. We now place ourselves in such a position as to see the sky by reflection on the surface in question, holding, at the same time, a black thread stretched horizontally at a small distance from the film in such manner that a portion of its reflected image shall be perceived in the space circumscribed by the film. The complete image of the thread now appears to be formed of three parts—two without and one within the laminar figure; the former are both incurvated near the film, in consequence of the capillary elevation before spoken of; as regards the third, if the circumscribed surface has, in its middle, a plane portion, we shall find, by suitably adjusting the thread, a position of the latter for which the middle of the image will be rectilinear. This will be the case with films whose diameter exceeds two centimetres, but within that limit the entire part of the image in the interior of the film will appear curved.

When the film has a large diameter, that part of the image of the thread is rectilinear for nearly its whole length; it curves only toward its extremities, by virtue of the capillary attraction; but its straight portion is not in the prolongation of the straight portions exterior to the film; it will be seen a little lower. This depression, which shows that the circumscribed plane surface is, as has been said, below the exterior level, becomes less decided in proportion as the diameter of the film is more considerable—a circumstance referable to the diminution of the curvature, and consequently of the pressure of the film, but which is still very perceptible for a film of a decimetre in diameter.

§ 4. The reasoning of § 2 necessarily supposes that the film rests by its actual border upon the plane surface of the liquid in the vessel, and that the portion of that surface circumscribed by the film preserves its plane shape and its level; now, these conditions, being, as has been just seen, never all entirely fulfilled, it follows that the reasoning in question can only be considered sufficiently rigorous when the variance from the imaginary conditions on which it rests is but inconsiderable. To be more precise: If we fill with glyceric liquid, and somewhat above the edge, a large porcelain salver, previously levelled and placed on a table opposite a window, and, after having deposited thereon a bubble, station ourselves so as to see the film projected on a dark ground, and, closing one eye, keep the other at the level of the little annular mass, we shall distinguish perfectly well the two meridian lines of this little mass, as well that which looks towards the exterior of the figure, as the commencement, proceeding from the summit of the crest, of that which fronts the interior. We therefore clearly perceive this summit, and can estimate, approximately, its vertical height above the exterior plane surface. We shall thus recognize that, for large bubbles, this height scarcely exceeds 2^{mm} , and is less still for small ones. On the other hand, when the film has large dimensions, when, for example, its diameter is a decimetre, the portion of the surface of the liquid circumscribed within its interior may be regarded as exactly plane through almost its whole extent. It results, in fine, from the experiments of the preceding paragraph, that with such a film, the depression of this surface, though still quite sensible, is yet very minute. From the results of § 28 of the 5th series, it follows that if the film, assumed to be hemispherical and of the diameter of a decimetre, were, although formed of glyceric liquid, deposited on pure water, the depression in question would be but $\frac{22.6}{100} = 0^{\text{mm}}.226$; and consequently in order to obtain the value of the de-

pression in the present case, that is, when the film is deposited on the glyceric liquid, it suffices to divide the preceding quantity by the density 1.1065 of that liquid, which reduces the depression definitively to $0^{\text{mm}}.204$. With such a volume of air and a hemispherical film, a state of things would exist therefore in close conformity with the conditions of the reasoning in question, and we may conclude that the film would, in effect, take that form, or that, at least, the deviation would be inappreciable.

But it is easy to show that, with a volume of air sufficiently small, the film will be far from constituting a hemisphere. Let us imagine, for instance, that the bubble of air is but one millimetre in diameter, and suppose, for an instant, that the film is hemispherical. Upon this hypothesis, the portion of the surface of the liquid circumscribed by the film and reckoned from the border of the latter, or, if you will, from the crest of the small annular mass, would necessarily constitute, by reason of its minute dimensions, a concave hemisphere, so that the bubble of air would continue to form an entire sphere of one millimetre in diameter. That being the case, let us remember that the pressure exerted by a spherical film in virtue of its curvature is (5th series, § 23) the sum of the actions separately due to the curvatures of each of its two faces; or, since these two actions are equal, the double of one of them. Now, the action of the interior face of our little hemispherical film would, as regards its effort to cause the bubble of air to descend, be counterbalanced by the opposite action of the concave hemisphere, which would, as I have said, limit the bubble beneath, and there would remain, on the one hand, the action due to the exterior face of the film, an action which would impel the bubble from above downward, and, on the other hand, a slight hydrostatic pressure which would impel this bubble from below upward if the lower point of it were below the level of the liquid. But, in the case of the glyceric liquid, it further follows, from the results of § 28 of the 5th series, by taking, agreeably to the remark above made, half the value

which they yield, and dividing by the density of the liquid, that the first of the above two actions would be equivalent to a difference of level of $10^{\text{mm}}.21$; while, even supposing the absence of the little annular mass, the second would evidently proceed only from a difference of level equal to the radius of the air-bubble—that is, to $0^{\text{mm}}.5$. With our small volume of air and a hemispherical film, equilibrium, then, is impossible; that it should exist, it would be necessary that the bubble of air should remain almost entirely beneath the level of the liquid, and hence should give rise to a film scarcely at all elevated and of very feeble curvature; then, in effect, the slight hydrostatic pressure which tends to cause the bubble of air to rise will be equivalent to the minute weight of a volume of liquid a little less than that of this bubble, and the light pressure exerted by the exterior face of the film, in virtue of its feeble curvature, will suffice to counterbalance it.

Experiment again fully verifies this deduction of theory. Having poured, to a certain height, glyceric liquid into the vessel with plane glass walls which served for experiments on the masses of oil, and slightly agitated the liquid in order to produce small bubbles of air, I chose one of these about 1^{mm} in diameter, and sufficiently near to one of the walls, and observed it by successively placing the eye a little below and then above the level of the liquid. In this way I perceived that the little bubble appeared spherical, and was so far immersed that its projection above the level was very inconsiderable.

§ 5. From this it is clear that if we form successive films on the surface of soap-water or glyceric liquid, beginning with a diameter of one decimetre, followed by others progressively smaller, a limit will be reached below which the films will exhibit a sensible depression, or appear, in other words, to constitute less than a hemisphere. In order to determine this limit approximately in regard to the glyceric liquid, I deposited the bubbles, as was indicated in the preceding paragraph, on the surface of the liquid contained in a salver a little more than full, and ascertained that they appear hemispherical only for diameters greater than about 3 centimetres; below that value the bubbles form segments sensibly less relatively to the entire sphere, and this diminution is the more decided as the diameter of their base is smaller.

§ 6. Although a film of spherical curvature thus formed at the surface of a liquid be in equilibrium of figure, still absolute repose does not exist: it slowly becomes thinner until it bursts. The principal causes of this have been long since indicated: they are, firstly, evaporation, in the case of liquids which are susceptible of it; and secondly, the action of gravity which causes the liquid constantly to descend from the summit of the film towards its base. And here again viscosity has a great influence: if this be very weak, it is plain that the gliding of the molecules towards the base of the film will be effected with great rapidity, and consequently the film will have scarcely any persistence; hence, when we succeed in forming films with pure water, they scarcely subsist at all. This remark concerning the agency of viscosity in the duration of films had already been presented, though in a somewhat different manner, by Professor Henry,* in regard to bubbles of soap compared with those of pure water.

§ 7. Let us suppose now that a second bubble of air rises from the bottom of the vessel, and that at the moment when it has nearly reached the surface, it happens to be partly under the first film; it will thus occasion the formation of a film which will necessarily lift up the former on one side, so that the two quantities of air respectively imprisoned by these two films will be separated by a portion of the second, as by a liquid partition. But this partition will not observe the curvature of the rest of the second film, as I shall proceed to show.

In virtue of their liquid nature, films can evidently not meet under angles with linear edges: for continuity it is necessary that, along the whole line of junc-

* See the article cited in 3d note of section 1.

tion, a small mass with surfaces strongly concave in a perpendicular direction to this line should take form; it is what is realized, as has been seen (2d series, §§ 31 and 32) when, in the interior of the alcoholic liquid, a laminar figure of oil is produced by the gradual exhaustion of a polyhedron. Let us recall, in this respect, the experiment of § 2 of the 5th series—an experiment in which a similar mass, though a thick one, establishes the transition between a plane film and two curved films, as is seen in meridian section in Fig. 1 of this 5th series. It will be understood, therefore, that in the case of our films of soap-water or of glyceric liquid, a mass of this kind exists, though too minute to be distinguished, along the whole length of the arc of junction of the partition and the two other films; now, the surfaces of the latter and that of the partition being thus united by small surfaces having their own curvatures, it is plain that these small surfaces establish an entire independence between the respective curvatures of the other surfaces. It is thus, for example, that in the experiment above recalled, a plane film is connected with two films which are portions of catenoids. In this experiment, it is true, the junction takes place by a thick mass; but the result must evidently be the same as regards the independence of the curvatures, however minute be the transverse dimensions of the mass serving as an intermedium.

This being the case, let us remark that the partition must also constitute a portion of a sphere, for it falls within the same conditions as the two other films; that is to say, it has, like the latter, for limits the small mass of junction and the water of the vessel. As regards its curvature, this evidently depends on the difference of the action exerted on its two faces by the two portions of imprisoned air. If these two portions of air are equal, the two films will pertain to equal spheres, which will press the two volumes of air with the same intensity, and consequently the partition, exposed on its two faces to equal actions, will have no curvature, or, in other words, will be plane; but if the two quantities of air are unequal, in which case the two films will pertain to spheres of different diameters, and will therefore press these two quantities of air unequally, the partition subjected on its two faces to unequal actions will acquire convexity on the side where the elasticity of the air is least, until the effort which it exerts, in virtue of its curvature, on the side of its concave face, counterbalances the excess of elasticity of the air which is in contact with that face.

Let ρ , ρ' , and r be the radii of the spheres to which respectively appertain the larger film, the smaller and the partition, and let p , p' , and q be the respective pressures which they exert, in virtue of their curvatures, on the air which bathes their concave faces. These pressures being (5th series, §§ 22 and 28) in the inverse ratio of the diameters, and consequently of the radii, we shall

have $\frac{p}{q} = \frac{r}{\rho}$, and $\frac{p'}{q} = \frac{r}{\rho'}$; but, according to what has been seen above, it is

necessary, for equilibrium, that we should have $q = p' - p$; whence, $1 = \frac{p'}{q} - \frac{p}{q}$.

Transferring to this last equation the above values of $\frac{p'}{q}$ and of $\frac{p}{q}$, and re-

solving by reference to r , there results $r = \frac{\rho\rho'}{\rho - \rho'}$, a formula which gives the

radius of the partition when we know those of the two films. If, for example, these two films pertain to equal spheres, we have $\rho = \rho'$, and the formula gives $r = \text{infinity}$; that is to say, the partition is then plane, as we have already found it to be. If the radius of the smaller of the two films is half that of the larger, in other terms, if we have $\rho' = \frac{1}{2}\rho$, the formula gives $r = \rho$; in this case, consequently, the curvature of the partition will be equal to that of the larger film.

§ 8. In order to complete the study of our laminar system it remains only to inquire under what angles the two films and the partition intersect one another.

With this view, let us remark that the small mass of the junction which prevails along the entire common edge of these angles, and which was spoken of in the preceding paragraph, must of itself have its equilibrium of figure. Now, as it has three surfaces it is necessary that the curvatures of these should have to one another a ratio which permits this equilibrium. The small mass has, longitudinally, curvatures which are not of the same direction for its three surfaces, but in consequence of its extreme tenuity in thickness, its transverse curvatures are enormous, relatively to the longitudinal curvatures in question, so that the influence of the latter may be overlooked in view of that of the former. On the other hand, the two small surfaces which face the interior of the system are pressed upon by the respective elasticities of the two portions of imprisoned air, elasticities which are generally unequal, and which exceed the atmospheric pressure, while the small surface which faces the exterior is only subjected to this latter pressure; but as the differences between these three actions of the air result from the curvatures of the two films, curvatures which are extremely feeble compared with the transverse curvatures of the small mass, the influence of these differences may also be overlooked by the side of that of the transverse curvatures in question. Hence it is evidently requisite, for the equilibrium of the small mass, and consequently for that of the whole system, that if we conceive this small mass cut by a plane perpendicular to its axis, the three concave arcs which will limit the section shall be closely identical. Now, from this near identity it necessarily results that the two films and the partition terminate at the small mass under angles either strictly equal, or very nearly so—angles, consequently, each of 120° , or which will differ from this value by an unappreciable quantity.* We shall presently see this result and those of the preceding paragraph verified by experiment.

§ 9. If the bubble of air which gives rise to the second film (§ 7) arrives at the surface of the liquid sufficiently far from the first film for the spherical caps to be complete and isolated, or, what amounts to the same thing, if we deposit on the liquid two bubbles at a suitable distance from each other, the two liquid caps, drawn by capillary action in the same way with light floating bodies, will by degrees approach until they touch one another. To understand what would then happen, let us recall a fact manifested by full spheres of oil in the interior of my alcoholic mixture. When two such spheres have come in contact, the system which they form is not in a state of equilibrium; the two spheres unite to form but a single one, and the reason of this is easily apprehended. This contact cannot take place at one sole point; it must necessarily occur throughout a small surface, so that the two masses constitute in reality only one; but since this is finite and entirely free, and is a system of revolution, the sole figure of equilibrium that it can assume (4th series, §§ 2 and 38) is that of a single sphere. Now, it is visible that the same thing must have a tendency to occur in regard to our two spherical laminar caps when the two small annular masses which exist along their bases (§ 3) have united at the place of their contact; that is to say, the two caps will tend to form but a single one; but in order that this tendency may have its full effect, it would be necessary that the two liquid films should open at the place of contact; and as cohesion resists this, we perceive that the opening will be replaced by a partition, and that the same co-ordination will obtain here as in the system of the two preceding paragraphs. These results, also, will be verified by experiment.

§ 10. We have seen (§ 7) that the radius r of the partition is determined, when we know the radii ρ and ρ' of the two films, by considering the relative value of the pressures respectively exerted by these three portions of spherical caps on the two quantities of included air. On the other hand, the considera-

* By considering liquid films as stretched membranes, (§ 2) we should equally arrive at the equality of the angles between three films which join one another by the same liquid edge.

§ 11. The existence of partitions is a fact well known to all who have amused themselves with making soap bubbles; but it was necessary to submit to the control of experiment the results established in what precedes, from § 7 onward, and first those which relate to the curvature of the partition and the angles under which that partition and the two films intersect each other.

With that view I traced on three sheets of paper three figures, representing the bases of three systems, each formed of two portions of laminar spheres and of a partition. I understand by the base of such a system the assemblage of arcs of a circle by which it rests on the surface of the liquid, abstraction being made of the small annular masses. The three outlines are reproduced, at a third of their size, by figures 12, 13, and 14; they were constructed upon the same

Fig. 12

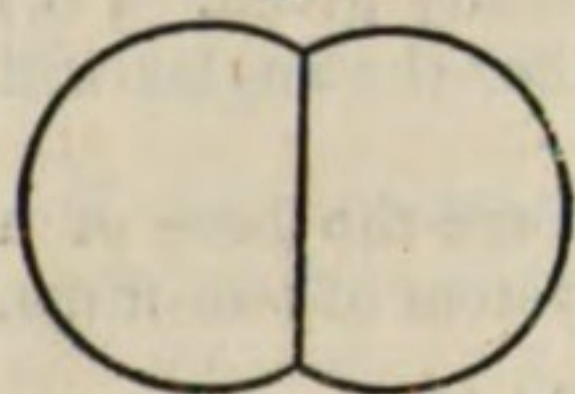


Fig. 13

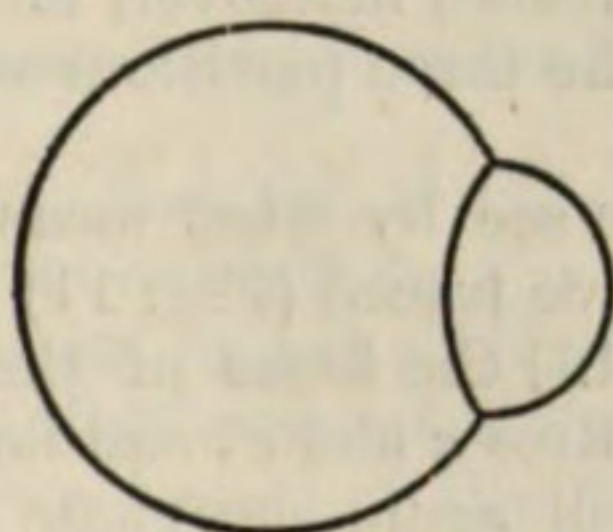
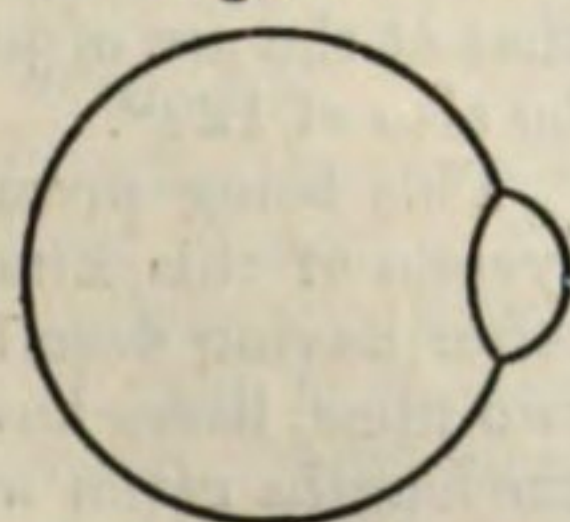


Fig. 14



method with figure 11, the arcs being marked in lines about a millimetre in breadth, for what reason will presently be seen. In the first drawing the diameters of the two films were equal, in the second they were as 2 to 1, and in the third as 3 to 1. To make use of one of these outlines, it was placed on a table, and above it was laid a plate of thin glass, the upper face of which was then moistened with glyceric liquid. This being done, a bubble of the same liquid was inflated and was deposited on the glass plate above the portion of circumference which represented the base of the smallest film; this bubble immediately spread so as to form a hemisphere, the base of which had, designedly, a diameter a little less than the portion of circumference in question. A second bubble was then inflated, and in like manner deposited above the portion of circumference representing the base of the other film, the precaution being again taken that after its development on the glass it should have a diameter somewhat smaller than that circumference. As, in depositing this second film, it was placed in contact with the first, the two hemispheres penetrated one another partially, and remained united with a partition. Matters being thus prepared, the orifice of the pipe was dipped in glyceric liquid, as if to form a bubble, and this orifice being then applied toward the inferior part of the smaller film, a little blowing was practiced; the same operation was next performed for the other film, then again for the first, then for the second, and so on, the glass plate being at the same time made to slide, by small quantities, on the drawing, and, with suitable care, it was contrived to give to the two films the diameters of the portions of circumference as traced, and now the base of the laminar system obtained, a base formed of those of the two films and that of the partition, exactly covered the drawing. It has been said that the drawings were in broad lines, and this was done because these lines were to be observed through the small annular masses; had the lines been fine, the refractions produced by these masses would have prevented them from being distinguished.

§ 12. In order to verify also the results of § 9, I deposited successively on the surface of the glyceric liquid, contained in the large porcelain plate, (§ 3,) two bubbles of this same liquid, in such manner that the two spherical caps which they formed might be separated by a certain interval. When this was about a centimetre, the films moved indeed toward one another, and united with a partition; but if the two films had large diameters, (10 centimetres or more,) the partition was not in general produced unless the union took place

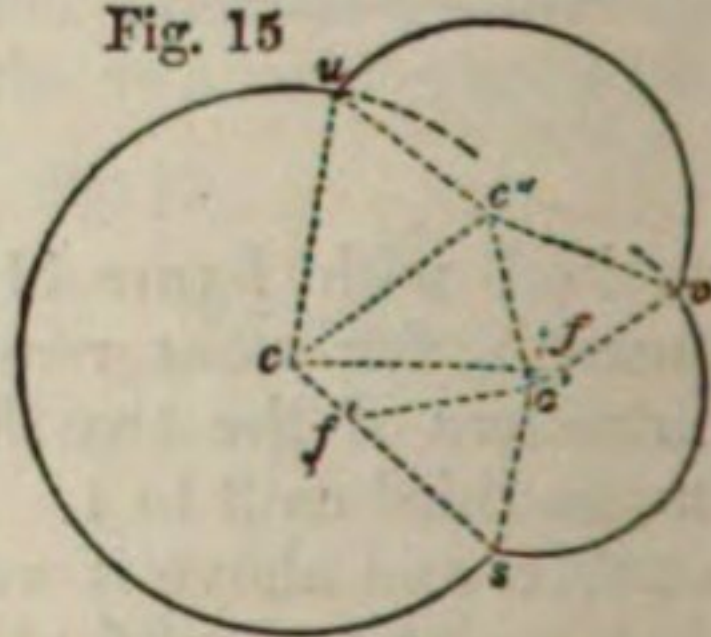
but a few moments after the formation of the films; when these were at first somewhat too distant from each other, so that the time required for their spontaneous congress was rather long, they united without a partition, becoming transformed into one large hemisphere, because doubtless they had grown too thin, and the incipient partition had broken before its existence could be verified.

§ 13. If a third spherical laminar cap joins itself to two others already united, the system will evidently have three partitions, namely, one proceeding from the union of the first two films, and two from the union of each of these films with the third. These three partitions will necessarily terminate at the same arc of junction, and, supposing that they still have spherical curvatures, it will result that at three lines of junction of each of them with two of the films the angles will still be of 120° ; it will result, moreover, for reasons already given, (§ 8,) that at the arc of junction of the three partitions with each other the angles will be also of 120° .

This being premised, let us see by what means we can trace the base of a system of this kind, as we have traced (Fig. 11) that of a system of two films. After having described (Fig. 15) the bases of the first two films, bases having for centres c and c' , and for radii the lengths given which we will again designate by ρ and ρ' , let us take, commencing at the point s , where these two bases meet, and on the radii sc and sc' , two lengths sf' and sf , equal to one another and to the radius ρ'' of the third base, then from the points c and c' as centres, and with the lengths cf and $c'f'$ as radii, let us trace two arcs of a circle; their point of intersection on c'' will be the centre of the base of the third film, a base which we will then describe with the radius ρ'' . Let us, in effect, suppose the problem solved, and this base traced. If we draw from the point u where it terminates at one of the former the right lines uc and uc'' , which will be respectively equal to ρ and ρ'' , these lines will make between them an angle of 60° , like the right lines sc and sc' ; whence it follows that the triangle cuc'' will be equal to the triangle csf , in which sc and sf are also respectively equal to ρ and ρ'' , and thus cc'' will be equal to cf ; for the same reasons the triangle $c'vc''$ will be equal to the triangle $c'sf'$, and consequently $c'c''$ will be equal to $c'f'$. Let us propose now to trace the bases of the three partitions. Those of the three films being described (Fig. 17) after the preceding outline we determine, as in Fig. 11, the centre d of the partition pertaining to the first two films, and commencing from s , by drawing sd making with sc' an angle of 60° , until it meets, at d , with the line cc' prolonged; we determine likewise the centre f of the partition pertaining to the first and the third film by drawing uf , making an angle of 60° with $c'u$, until it meets, at f , with cc'' prolonged; finally, we determine by the same process the centre g of the third partition. There remains then only to describe from the points d , f , and g , as centres, and with the radii ds , fu , and gv , three arcs of a circle beginning, respectively, at the points s , u , and v , and directed toward the middle of the figure; these arcs will be the bases of the three partitions, on the hypothesis, however, that these partitions are portions of spheres. If the figure has been constructed with care, we shall recognize, 1st, that the three arcs just spoken of all terminate at the same point o ; 2d, that the three centres, f , d , and g , are disposed in a right line; 3d, that if we join the point o to these three centres, the angles fod and god are equal, and each of 60° .

§ 14. But as it might be thought that these results of a graphic construction are merely very close and not strictly exact, I proceed to establish them absolutely, assuming, however, that the angles of the films with one another and with the partitions are precisely of 120° . I am indebted for this demonstration to M. Vander Mensbrugghe, a young doctor of sciences of our university.

Fig. 15



Let us first demonstrate that the three centres f , d , and g , are in a right line. For this purpose, repeating what has been done in Fig. 11, let us take on sc a length $sw = sc' = \rho'$, and join $c'w$; we know that this last line will be parallel to sd , and consequently we may assume $\frac{dc}{dc'} = \frac{sc}{sw} = \frac{\rho}{\rho'}$. For the same reason, in considering the two portions of circumferences which have for centres c and c'' , and which intersect each other at u , we shall have, by simply reversing the two ratios, $\frac{fc''}{fc} = \frac{\rho''}{\rho}$; and the two portions of circumferences having for centres c' and c'' , and which intersect at v , will also give $\frac{gc'}{gc''} = \frac{\rho'}{\rho''}$. Multiplying these three equalities, member by member, there results $\frac{dc fc'' gc'}{dc' fc gc''} = 1$.

Let it be remarked now, 1st, that the three centres, d , f , and g , are on the prolongations of the sides of the triangle $c c' c''$; 2d, that the six quantities, $dc, fc', gc', dc', fc, gc''$ are the distances, reckoned on these same prolongations, from the three points d, f , and g , to the three summits c, c' , and c'' ; 3d, that, in the last of the above formulas, the three factors of the numerator represent right lines, no two of which have a common extremity, and that the same holds with regard to the three factors of the denominator. Now we know, by a theorem of the theory of transversals, that when the condition expressed by this formula is fulfilled in regard to any triangle, the three points in question, taken on the prolongations of the three sides, are necessarily in a right line. Our three centres d, f , and g partake, therefore, of this property.

This first point established, let us demonstrate the others. Let us consider the point o as being simply the intersection of the two arcs uo and vo , having for centres f and g ; let us join od, of , and og , and without inquiring at first whether od is really the radius of the arc having d for its centre, and proceeding from the point s , let us show that the angles fod and god are each of 60° , or what amounts to the same, that the angle fog is of 120° , and that the right line od is its bisector.

Let us seek first to determine the lengths fd and gd , and, to this end, let us consider them as pertaining, respectively, to the triangles fdc and $gc'd$, in which we can calculate the sides fc, dc, gc' , and dc' , as well as the angles which they comprise. To arrive at these last values, let us calculate the sides of the triangle $c c' c''$. By means of the triangle csc , in which the sides cs and $c's$ are, respectively, ρ and ρ' , and comprise between them an angle of 60° , we find without difficulty $cc' = \sqrt{\rho^2 + \rho'^2 - \rho\rho'}$; the triangles cuc'' and $c'vc''$ likewise give $cc'' = \sqrt{\rho^2 + \rho''^2 - \rho\rho''}$, and $c'c'' = \sqrt{\rho'^2 + \rho''^2 - \rho'\rho''}$. Whence, by the known formula, we deduce

$$\cos c'cc'' = \cos dcf = \frac{\rho^2 + (\rho - \rho')(\rho - \rho'')}{2\sqrt{\rho^2 + \rho'^2 - \rho\rho'}\sqrt{\rho^2 + \rho''^2 - \rho\rho''}};$$

in the same way we find

$$\cos cc'c'' = \cos gc'd = \frac{\rho'^2 + (\rho - \rho')(\rho'' - \rho')}{2\sqrt{\rho^2 + \rho'^2 - \rho\rho'}\sqrt{\rho'^2 + \rho''^2 - \rho'\rho''}}.$$

On another side we have

$$fd = \sqrt{fc^2 + dc^2 - 2dc \cdot fc \cos dcf} \text{ and } gd = \sqrt{dc'^2 + gc'^2 - 2dc' \cdot gc' \cos dc'g}$$

formulas in which the lines dc, fc, dc', gc' still remain to be determined; but in the triangle csc , in which we know that sw is parallel to sd , we have

$$\frac{dc}{cs} = \frac{dc'}{sw} = \frac{cc'}{cw};$$

whence, by replacing cs , sw and cw by their values ρ , ρ' and $\rho - \rho'$, as well as cc' by its value found above, we obtain

$$dc = \frac{\rho}{\rho - \rho'} \sqrt{\rho^2 + \rho'^2 - \rho\rho'} \quad \text{and} \quad dc' = \frac{\rho'}{\rho - \rho'} \sqrt{\rho^2 + \rho'^2 - \rho\rho'};$$

the triangles cuf and $c''vg$, on their part, will give

$$fc = \frac{\rho}{\rho - \rho''} \sqrt{\rho^2 + \rho'^2 - \rho\rho''} \quad \text{and} \quad gc' = \frac{\rho'}{\rho'' - \rho'} \sqrt{\rho'^2 + \rho'^2 - \rho''\rho'}.$$

There results, then, after substitutions and reductions, and by making, for the sake of abbreviation,

$$\sqrt{\rho^2\rho'^2 + \rho^2\rho''^2 + \rho'^2\rho''^2 - \rho^2\rho'\rho'' - \rho\rho'^2\rho'' - \rho\rho'\rho''^2} = P,$$

$$fd = \frac{\rho}{(\rho - \rho')(\rho - \rho'')} P,$$

$$gd = \frac{\rho'}{(\rho - \rho')(\rho'' - \rho')} P,$$

and consequently

$$fg = \frac{\rho''}{(\rho - \rho'')(\rho'' - \rho')} P,$$

Hence we deduce

$$\frac{fd}{gd} = \frac{\rho(\rho'' - \rho')}{\rho'(\rho - \rho'')}$$

On the other hand, according to the result of § 7, by observing that fo and go are respectively equal to the radii fu and gv of the two partitions which we are considering, we have

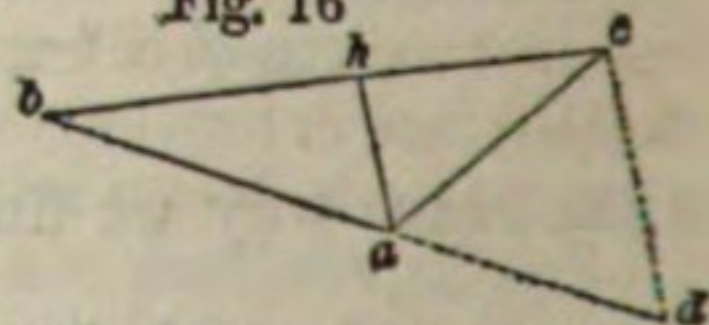
$$fo = \frac{\rho\rho''}{\rho - \rho''}, \quad go = \frac{\rho''\rho'}{\rho'' - \rho'}, \quad \text{whence} \quad \frac{fo}{go} = \frac{\rho(\rho'' - \rho')}{\rho'(\rho - \rho'')};$$

the two ratios $\frac{fd}{gd}$ and $\frac{fo}{go}$ are therefore equal, and consequently the right line do is the bisector of the angle fog .

Knowing, from what precedes, the three sides of the triangle fog , we thence deduce, after all reductions are made, $\cos fog = -\frac{1}{2}$; whence it results that the angle fog is of 120° , and consequently that the angles fod and god are each of 60° .

Let us seek lastly the length of the bisector do . With this view it is to be remarked that in every triangle of which one of the angles is 120° , there is a very simple relation between the bisector of that angle and the two sides which comprise it. Let abc (Fig. 16) be a triangle in which the angle at a is 120° ; let the side ba be prolonged by a quantity ad equal to ac , and join dc ; this line will be parallel to the bisector ah , for the angle dca will be 60° ; and since ad is equal to ac , the triangle dca will be equilateral, and the angle dca will be 60° like the angle cah ; we shall have therefore $\frac{dc}{ah} = \frac{ba}{ba+ad}$, where because $dc = ad = ac$, $\frac{ah}{ac} = \frac{ba}{ba+ac}$, and

Fig. 16



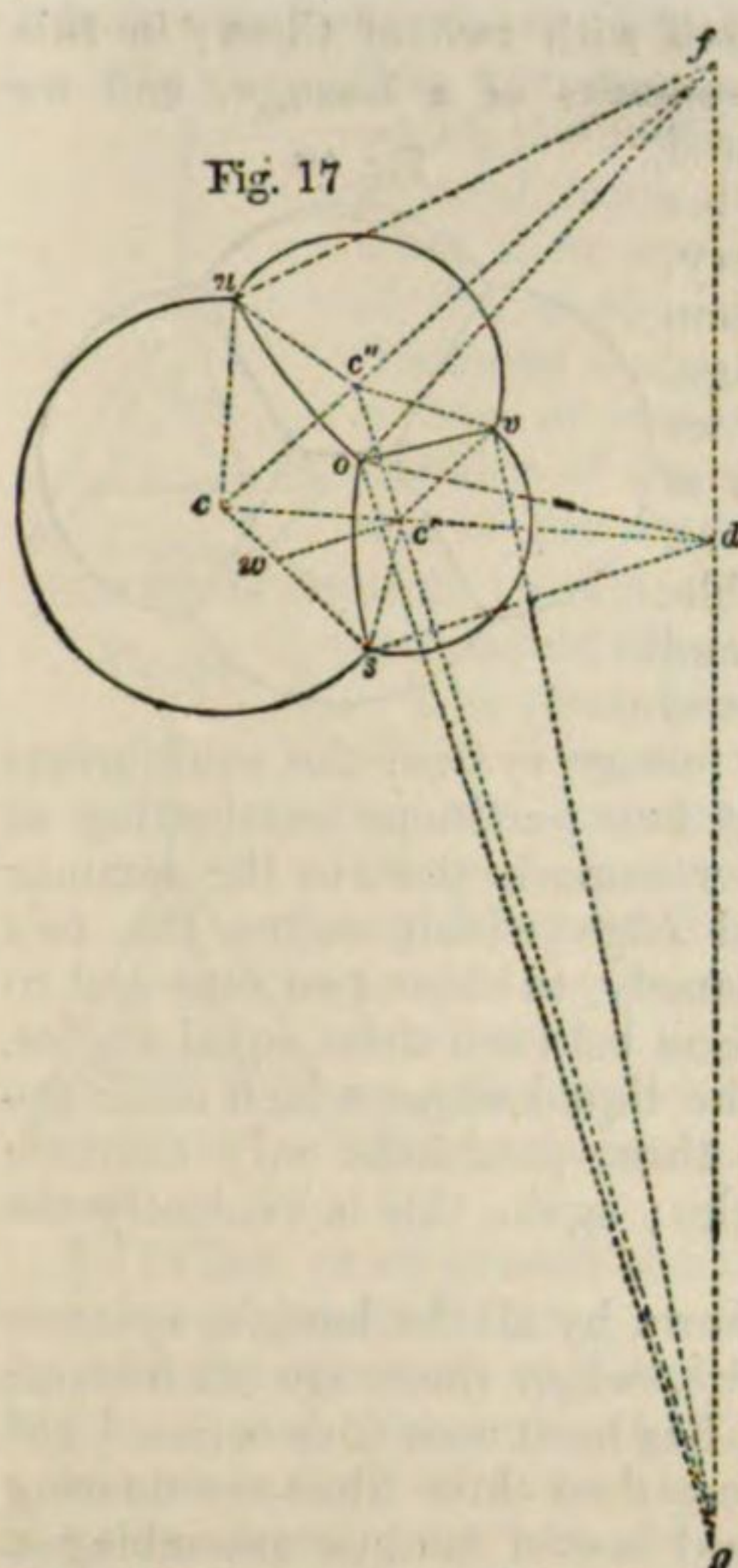


Fig. 17

$ah = \frac{ba \cdot ac}{ba + ac}$. This result applied to the triangle

fog (Fig. 17) gives therefore $do = \frac{fo \cdot go}{fo + go}$, and,

after substitutions, $do = \frac{\rho \rho'}{\rho - \rho'}$. Now, this is

precisely (§7) the value of the radius ds of the third partition. It results, then, from the above, as we had proposed to demonstrate, that the centres of the three partitions are in a right line; that the bases of these partitions meet at one and the same point; finally that the radii of these bases, commencing from the point in question, make with one another angles of 60° , and that hence these bases unite under angles of 120° .

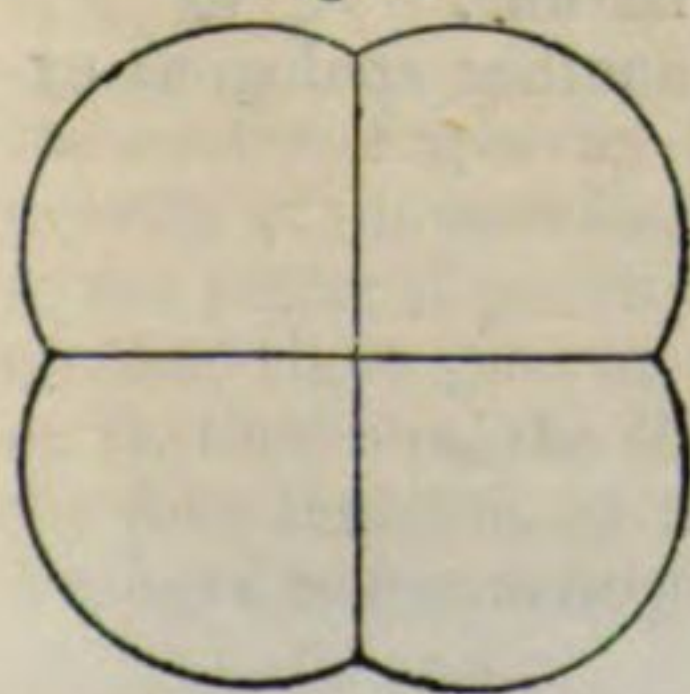
Now, since we can consider the three partitions as really constituting portions of spheres, it remains to prove that these three portions intersect one another by a single arc; but this is what evidently follows from the centres f, d, g of these three spheres being in a right line, and from these same spheres having a common point at o . Thus all the theoretic conditions are satisfied by three partitions of spherical curvature disposed, with the three caps, so as to form a system having for its base

that which was traced by the construction of the preceding paragraph; it must then be regarded as extremely probable that the system will really take that form.

§ 15. This, in effect, I have experimentally verified by the means heretofore described, (§ 11,) by tracing, namely, in broad lines on paper, in the manner indicated, the base of a system of three spherical caps with their partitions. The base of the laminar system thus realized has been found to be exactly superposed on the drawing. The graphic constructions given in preceding pages for the bases of systems of spherical caps implicitly suppose the law of the inverse ratio of the pressure to the diameter; the exact coincidence of the bases of the systems realized with the bases traced furnishes therefore a new verification of that law, in addition to the direct verification obtained in § 28 of the fifth series. It was to the present experiments that I had allusion in the paragraph just cited.

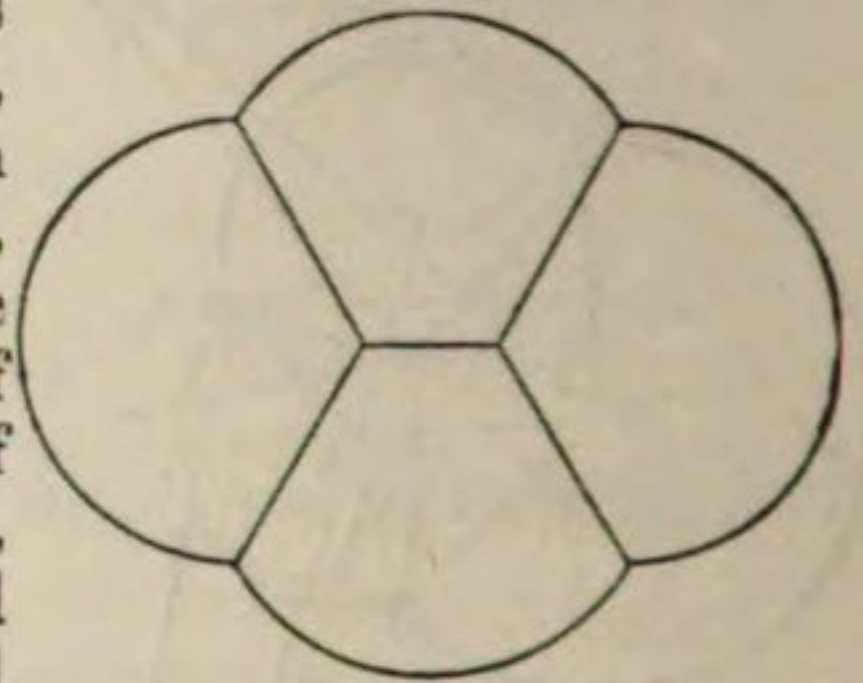
§ 16. If we imagine that a fourth spherical cap unites itself with the system of the three preceding ones, we can conceive two different arrangements of the assemblage besides that in which the fourth cap should so place itself as to be united with but one of the others. One of these arrangements would contain four partitions uniting by a single edge, and the other would contain five uniting by two edges. To simplify the question and the graphic constructions, I will suppose the four caps to be equal in diameter, in which case all the partitions will evidently be plane. Then, it may be conceived, in the first place, that the four caps unite in such way that their centres shall be placed like the four summits of a square, which will give the system whose base is represented by Fig. 18, where there are four partitions terminating at the same edge under right angles; this system is evidently one of equilibrium, since everything in it is symmetrical. It may be conceived, in the second place, that,

Fig. 18



three caps being first united, the fourth unites itself with two of them; in this arrangement, the four centres will be at the summits of a lozenge, and we shall have the system whose base is represented by Fig. 19, where there are five partitions. This system also is evidently, by reason of its symmetry, a system of equilibrium; but here not more than three partitions terminate at the same liquid edge, forming between them angles of 120° . Now, if we attempt to realize on the glass plate the first of these two systems, we shall either not succeed, or, if produced at all, its duration will be inappreciable, and it passes rapidly into the second. The second system is obtained directly without difficulty, and persists. Hence we may conclude that in the former system the equilibrium is unstable, and it thus becomes probable that four partitions terminating at the same edge cannot coexist. We may further remark that, in the laminar assemblage of Fig. 11, the semicircular liquid edge which unites the two spherical caps is only common to three films, namely, to these two caps and to the partition; and these three films, we know, form between them equal angles. In the assemblage of fig. 17, likewise, each of the liquid edges which unite the caps two by two is like that which unites the three partitions, only common to three films forming between them equal angles; again, this is evidently the case in the assemblage of Fig. 19.

Fig. 19



Let us compare these facts with one of those shown by all the laminar systems which occupy my polyhedral frames of iron wire, when these are withdrawn from the saponaceous or the glyceric liquid. It has been seen (5th series, § 19) that in each of these systems there are never more than three films terminating at the same liquid edge. Here then is a general law of laminar assemblages. Moreover, it follows from considerations before stated (§ 8) that the angles under which the three films intersect one another must always be equal or differ only by inappreciable quantities, and this equality is easily verified, as we shall presently see, in all those systems which are composed of plane films.

With regard to the instability of a system in which more than three films should terminate at the same liquid edge, I will recall, as another proof, the curious phenomenon presented in the production of the laminar system of the regular octahedron, when I was experimenting with oil in the interior of the alcoholic liquid. When, as I have said, (2d series, § 35.) after having formed the full octahedron, we gradually withdraw oil from it by means of the small syringe, the eight faces grow concave equally and at once, and when the films begin to form, but are still joined by thick masses, they are all directed towards the centre of the figure, so that the system tends towards the arrangement which I here present anew, (Fig. 20,) an arrangement in which four films terminate at one liquid edge; but when the thickness of the masses of junction is diminished to a certain limit, a spontaneous change is effected, and the system takes definitively another form. I will now add that, in this latter form, no more than three films terminate at each liquid edge. In fine, the laminar system of the quadrangular pyramid offers another analogous ex-

Fig. 20



ample equally curious. I have given, in the second series, as the outline of that system, the one which I reproduce here (Fig. 21,) in which the liquid edge $a b$ is common to the four films which proceed from the four oblique edges of the frame-work; but what then deceived me was that, with oil and in the interior of the alcoholic liquid, this edge preserves so considerable a thickness that it is impossible to raise it without occasioning a rupture of one of the films—a thickness which maintains the stability of the system; now when we realize the laminar system of this frame by means of the glyceric liquid, the edge in question is found to be replaced by an additional lamina, (Fig. 22,) and then each liquid edge is common to no more than three films.

Fig. 21

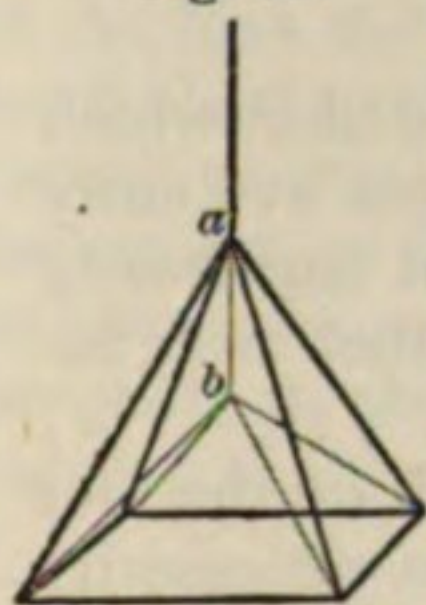
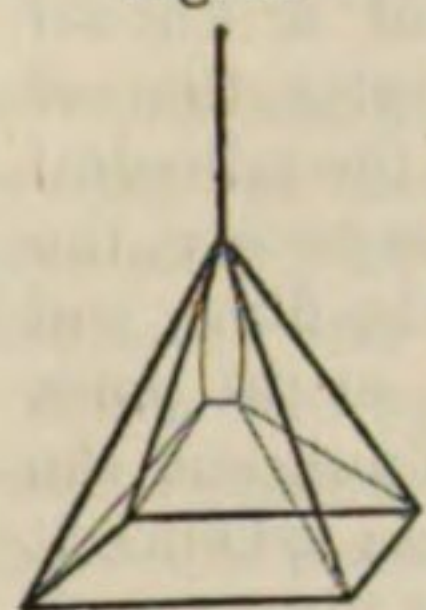


Fig. 22

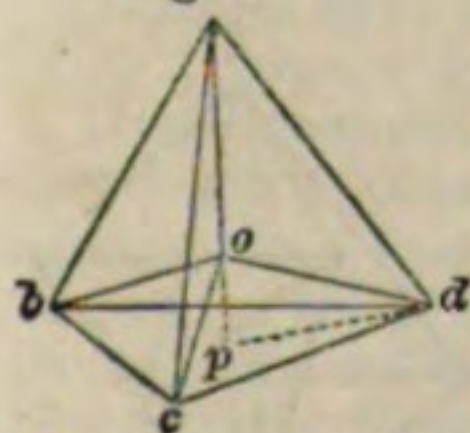


The pyramid of figures 21 and 22 has more height than that which is represented in the second series; it is because with this last the laminar system obtained by means of the glyceric liquid always presents, from its formation or shortly after, a slight irregularity in the position of the four liquid edges directed towards the summits of the base—an irregularity which is not produced with a higher pyramid. I shall recur in the sequel to this irregularity, which connects itself with an order of facts hereafter to be examined, and of which I shall then indicate the cause.

§ 17. Let us at present remark that in the systems of figures 15 and 19 there are four edges terminating at the same point, namely, the three which unite two by two the spherical caps and that which unites the three partitions. Now, as has been seen, (5th series, § 19,) the same fact presents itself in all our laminar systems obtained with the glyceric liquid: the liquid edges which terminate at the same liquid point are always four in number; here again, then, there is a general law of laminar assemblages. It may be added that if we apply to the point in question the considerations advanced (§ 8) in regard to edges, we shall conclude that these must intersect each other at this point under angles either equal or exceedingly near equality. And, in fact, the junction of the small concave surfaces pertaining to the edges produce, necessarily, around the point where they unite, four small surfaces strongly concave in all directions—surfaces whose capillary equilibrium requires equal or very nearly equal curvatures, which implies the absolute equality, or very nearly such, of the angles which we are considering.

Let us seek the value of these angles, supposing their equality to be absolutely exact. When the liquid edges are curved, it is proper to replace the arcs by their tangents at the point where they terminate, so that it suffices, in all cases, to imagine four right lines terminating at a single point under equal angles. In order, therefore, to follow the most simple method, let us consider a regular tetrahedron $a b c d$, (Fig. 23.) Let o be the centre of this tetrahedron; draw the lines oa, ob, oc, od to the four summits; these lines will evidently form with one another equal angles, whose value will consequently be that which it is proposed to obtain. This being premised, let us prolong the line ao to p , where it attains the base, and join pd ; the triangle $o p d$ will be rectangular at p . Let it be remarked now that the point o is the centre of gravity of the tetrahedron, and that the point p is the centre of gravity of the base $b c d$; now we know that if, in any pyramid, we join the summit to the centre of gravity of the base, the centre of gravity of the pyramid is situated on that right line, at three-quarters of its length reckoning from the summit; op is, therefore, the third of oa , and as the point o is at an equal distance from the four summits, op is also the third of od . In the rectangular triangle $o p d$ we have consequently $\cos dop = \frac{1}{3}$; whence results $\cos doa = -\frac{1}{3}$. Thus,

Fig. 23



Let it be remarked now that the point o is the centre of gravity of the tetrahedron, and that the point p is the centre of gravity of the base $b c d$; now we know that if, in any pyramid, we join the summit to the centre of gravity of the base, the centre of gravity of the pyramid is situated on that right line, at three-quarters of its length reckoning from the summit; op is, therefore, the third of oa , and as the point o is at an equal distance from the four summits, op is also the third of od . In the rectangular triangle $o p d$ we have consequently $\cos dop = \frac{1}{3}$; whence results $\cos doa = -\frac{1}{3}$. Thus,

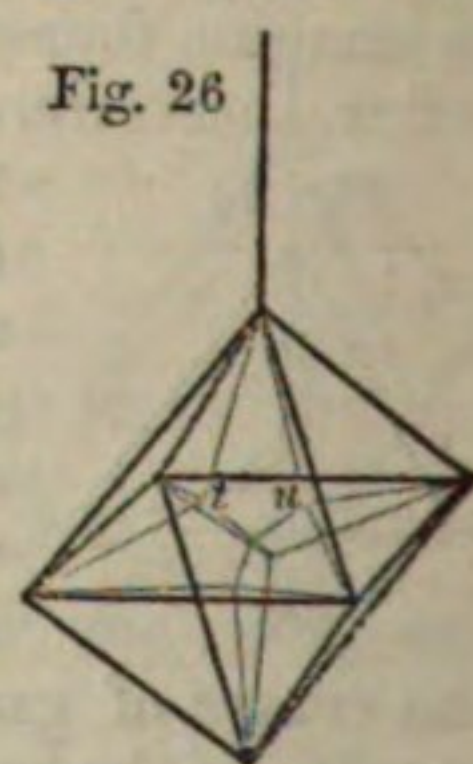
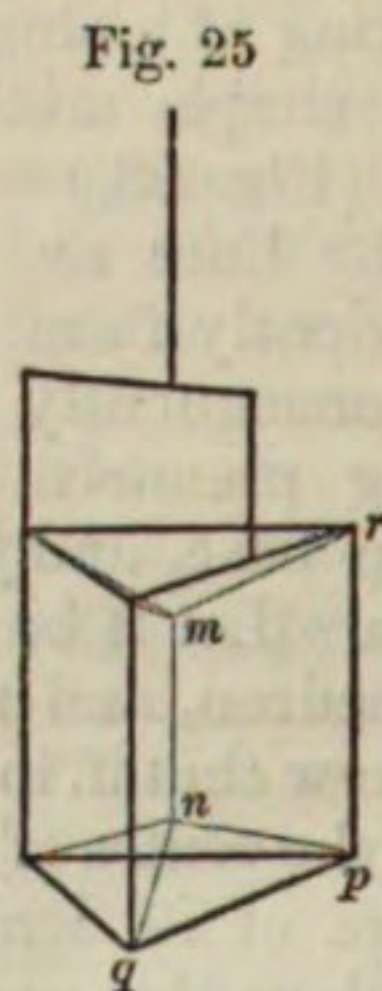
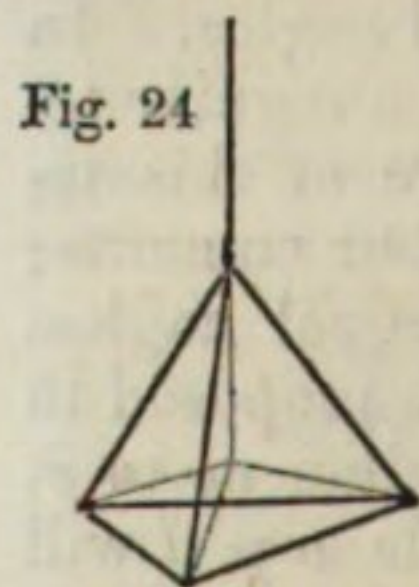
when the four right lines terminate at the same point under equal angles, each of these angles has for its cosine $-\frac{1}{3}$; we find thence that this angle is $109^{\circ} 28' 16''$, that is to say, very nearly 109 degrees and a half.

Such, then, in laminar assemblages, is the value of the angles under which four liquid edges terminate at a liquid point. Each of these edges evidently unites three films, and, at least in the case of rectilinear edges, it necessarily results from the symmetry of the assemblage that these films must form between them equal angles.

Conversely, if the films which unite three by three along each of the four liquid edges form between them equal angles, these four edges also necessarily form between them equal angles. In effect, supposing the films to be plane, the system evidently constitutes an assemblage of four trihedral angles, in each of which the three dihedral angles are equal; now, in virtue of a known theorem, this equality implies, for any one of these trihedral angles, that of the plane angles; but each of these last being common to two of the trihedral angles, it follows that, in the system, all the plane angles, that is to say, the angles which the four edges form between them, are equal. If the films, and consequently also the edges, are curved, it is clear that we may, at the point common to these edges, replace the films by their tangential planes and the edges by their tangents, which will be intersections of these planes; whence it results that, in all cases, the equality of the angles under which the films terminate at their common point, and the equality of the angles under which three films unite at the same edge, are, at least in the immediate vicinity of the point in question, necessary consequences one of the other.

§ 18. Let us apply this principle to the laminar assemblage, the base of which is represented by Fig. 17. The graphic construction of this base is founded on the equality of the angles under which the films and the partitions terminate three by three at their common edges, and has been found (§ 15) to be fully verified by experiment; the four edges of the system meet then necessarily at their common point under equal angles. The principle evidently applies alike to the two points of the assemblage of Fig. 19, at which four edges terminate.

§ 19. We will recur now to the systems formed in frames of iron wire. Those of them which are composed of plane films enable us to verify this equality of the angles between the three edges which terminate at the same liquid point, for we can generally apply direct measurement; they consequently enable us also (§ 17) to verify the equality of the angles between the three films which terminate at the same liquid edge. The systems of this nature which were realized in my frames are three, namely: that of the regular tetrahedron, that of the equilateral triangular prism, and that of the regular octahedron. I here reproduce the drawings (Figs. 24, 25, and 26.) It must not be forgotten, for the



understanding of these delineations and the greater part of those which follow, that, in the laminar systems which they represent, a film proceeds from each of

the solid edges, directing itself towards the interior of the frame, and attached to the other films by the liquid edges which the drawings represent in fine lines. In the first the equality in question is evident, the whole being perfectly symmetrical in every direction; it will further be seen that the four liquid edges occupy precisely the positions of the right lines oa , ob , oc , od , of Fig. 23. In the second, as the angle between the verticle edge mn , and the oblique edge np , for example, must have $-\frac{1}{3}$ for cosine, it follows that the vertical height of the point n , above the plane of the base, is the third of np , whence it is easily deduced that, designating by a the edge pq of the base, this vertical height is equal to $\frac{a}{2\sqrt{6}}$. Accordingly, if b designate the lateral edge pr of the frame,

we have $mn = b - \frac{a}{\sqrt{6}}$. In the frame which I employed, the edge b was 70^{mm}.70, and the edge a 69^{mm}.23; * by substituting these numbers in the above formula we find $mn = 42^{\text{mm}}.44$; now the measurement by the cathetometer gave $mn = 42^{\text{mm}}.37$, a value which differs from the preceding by only 0^{mm}.07, that is, by less than two thousandths of the one or the other.

As to the system of the regular octahedron, it is composed of plane films when obtained with glyceric liquid, as I have already stated in the fifth series, while it is formed of curved films when realized with oil in the interior of the alcoholic liquid (2d series, § 35;) further on I shall indicate the cause of this difference, but at present I shall occupy myself only with the system of plane films. This system is both elegant and remarkable, consisting, as is shown by Fig. 26, of the following parts: 1. Six quadrilaterals elongated in the direction of one of their angles, having each the summit of that angle at one of those of the frame and the summit opposite to the centre of the figures; in each couple

* It is here necessary to explain in what manner these valuations have been obtained. A frame of iron wire being incapable of geometric exactness, each of the lateral edges was measured separately and the mean of the results taken; the same thing was then done in regard to the edges of the bases; but these measurements were not made directly on the edges, because their terminations were more or less masked by the soldering. The mode adopted was as follows: the frame having been placed vertically, and one of its lateral faces in front of the cathetometer, the distance comprised between the two horizontal edges was determined, by taking sight as near the vertical edge of the right as the soldering would permit, and then doing the same near the vertical edge of the left; afterwards the prism was turned on its axis, so as to present successively to the cathetometer the two other lateral faces, and the same operations were repeated on each of them; thus were obtained, for the length of the lateral edges, six valuations differing but little, the mean of which was found to be 69^{mm}.83.

This being done, the frame was placed horizontally on suitable supports in such manner that, while one of its lateral faces still looked toward the cathetometer, the two edges of the bases which bounded it to the right and left were vertical, and the same operations were conducted as in the former case; then turning the prism on its axis, the two other faces were examined, so that, for the edges of the bases also, six values were obtained, the mean of which was 68^{mm}.36. But these two means must undergo a slight correction: the liquid films do not in fact terminate at the solid wires according to the generating lines of which the distances have to be measured, but at other generating lines still more within the frame, whence it follows that the two above numbers are a little too small. To make the correction in a simple manner, it should be remarked that when a liquid film rests on a solid surface moistened, it is necessarily through the intervention of a small mass with concave transverse curvatures, and that, if the film be plane, it is necessary, for equilibrium, that these curvatures should be identically the same on both sides, which evidently requires that the plane of the film should be perpendicular to the solid surface. It thence results that if we prolong in thought the films of our system, each of them will pass by the axis of the wire on which it rests, and that consequently the prolonged liquid edges will alike terminate at the points where these axes intersect; we may, therefore, without altering in any manner the laminar system, and consequently the length of the liquid edge mn , substitute, in idea, for our frame, the assemblage of axes of the wires which compose it, which evidently amounts to the addition of the diameter of these wires to each of our two numbers; now this diameter, determined by means of the cathetometer, was found, as the mean of ten measurements taken on the different wires, equal to 0^{mm}.87; it is by the addition of this quantity to our two numbers that we arrived finally at the values of b and of a given in the text.

terminating at two opposite summits of the frame, the planes of the two quadrilaterals are at a right angle one with the other. 2. The twelve films proceeding from the solid edges, films each of which is triangular and limited at two of the long edges of the above quadrilaterals. There is in each of these quadrilaterals a dimension easy to measure by the cathetometer: it is the distance comprised between the summits t and u of the two opposite obtuse angles. Recurring to the principle that these two angles, as well as that whose summit is at the centre of the figure, must have $-\frac{1}{3}$ as cosine, it is easily demonstrable that this distance tu must be exactly the third of the length of the edges of the octahedron.

To show this, let $stou$ (Fig. 27) be one of the quadrilaterals; draw the two diagonals tu and os , which shall intersect at a right angle at m ; let the distance tu be designated by d , the common value of the three obtuse angles by α , and the length of the edge of the octahedron by a . In the triangle ots , the angle at t being α , and the angle at o being $\frac{1}{2}\alpha$, the angle at s will be $180^\circ - \frac{3}{2}\alpha$; according to this, the two rectangular triangles omt and smt will give $om = \frac{\frac{1}{2}d}{\tan \frac{1}{2}\alpha}$, and $ms = \frac{\frac{1}{2}d}{\tan(180^\circ - \frac{3}{2}\alpha)}$. Let us remark now that the diagonal os , or the sum of the two lengths om and ms , is half the height of the octahedron, and consequently, as will be readily seen, is equal to $\frac{a}{\sqrt{2}}$. We shall



have then $\frac{1}{2}d \left[\frac{1}{\tan \frac{1}{2}\alpha} + \frac{1}{\tan(180^\circ - \frac{3}{2}\alpha)} \right] = \frac{a}{\sqrt{2}}$. But knowing that the cosine of the angle α is $-\frac{1}{3}$, we shall find $\tan \frac{1}{2}\alpha = \sqrt{2}$, and $\tan(180^\circ - \frac{3}{2}\alpha) = \frac{1}{3}\sqrt{2}$. These values being substituted in the above formula, we obtain, as before said, $d = \frac{a}{3}$. In my frame, the measurements gave* for a the value

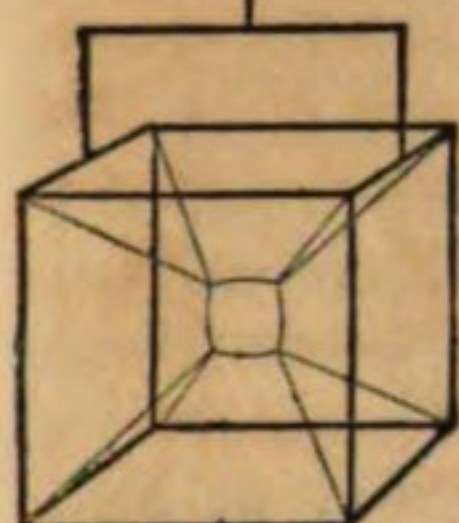
69^{mm}.49, of which the third is 23^{mm}.16; and for the distance d , the value 23^{mm}.14. The difference 0^{mm}.02 between the value calculated and the value measured, it will be seen, is even more insignificant than in the preceding case.

I have said (5th series, § 19) that a solid frame being given as to its form, it might be proposed, as a geometric problem, to occupy the interior with an assemblage of surfaces subjected to the laws which govern my laminar systems; now this has been done by M. Lamarle in regard to the regular octahedron by supposing all the surfaces to be plane, and he has thus found a system identical with that which he had seen produced in my frame.

§ 20. The laminar systems of other frames—those, namely, which contain curved films, and consequently curved liquid edges—also verify, and in a very curious though somewhat less precise manner, the equality of the angles under which these edges terminate at the same liquid point; they also verify, at least in the immediate vicinity of the latter, (§ 17,) the equality of the angles between the three films which join one another at each of these same edges.

* A regular octahedral frame may be considered as formed of an assemblage of three squares of iron wire whose planes cut one another diagonally, whence the frame was so placed that these squares should present themselves successively in front of the cathetometer with two of their sides directed vertically, and, in the three positions of the frame, the distance comprised between the two horizontal wires was measured as near as possible to each of these vertical wires. Thus were obtained twelve values, whose mean was 68^{mm}.59; moreover, eight measurements of the diameter of different wires were taken, which gave as a mean 0^{mm}.90. For the reasons stated in the preceding note, this diameter was added to the former number, and thus was found the value of a indicated in the text. As regards that of d , since small irregularities of the frame might introduce slight differences between the six quadrilaterals, that distance was measured in each of them, and the value of d given in the text is the mean of those six measurements.

Fig. 28



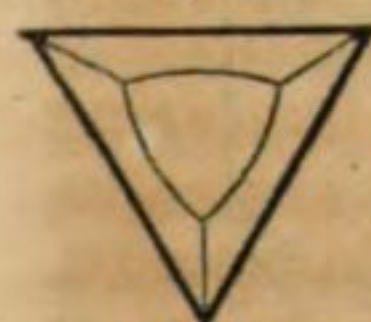
Let us take as a first example the laminar system of the cubic frame, a system whose outline is reproduced in Fig. 28.* Each of the angles of the central quadrangular lamina being 109 degrees and a half, and consequently superior to a right angle, it results that the sides of that lamina cannot be rectilinear and must constitute arcs slightly convex towards the exterior; this, in effect, is what the realized system exhibits.

I have represented in Fig. 25 the laminar system of the equilateral triangular prism, and have said that, designating by a the length of the edges of the bases, the height of each of the laminar pyramids which rest on those bases is

equal to $\frac{a}{2\sqrt{6}}$; but it will be understood that if the height of

the prism is less than double that quantity, or, in other terms, less than 0.4 of the sides of the bases, the system in question could not be produced. In this case, analogy, with other systems, of which I shall speak hereafter, had led me to foresee that the system would be composed of an equilateral triangular film parallel to the bases, placed at equal distances from these last, and attached by other films to all the solid edges; but as the angles of this laminar triangle must be 109 degrees and a half, and the angles of an equilateral triangle with rectilinear sides are but 60° , it followed necessarily that the sides of our laminar triangle were convex towards the exterior, like those of the lamina of the system of the cube, but that their curvatures were much more decided; now this was fully verified by experiment, except that the curvatures showed themselves very strong only in the vicinity of the summits. The height of my frame was

Fig. 29



about a third of the length of the sides of the bases. Fig. 29 represents this system as seen from above, which therefore constitute a second example in support of the proposition in question.

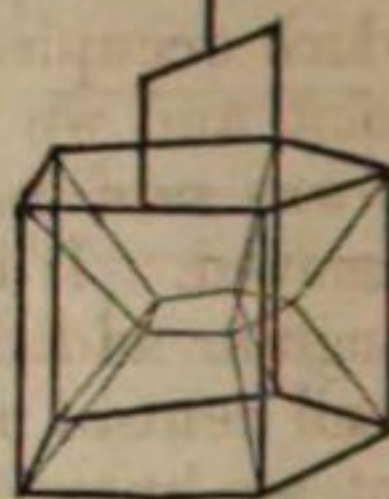
In the third place, if we take for a frame that of a regular pentagonal prism whose height is not too great relatively to the dimensions of the bases, the laminar system presents, at the middle of its height, a pentagonal film parallel to the bases, and to which attach themselves, as to the triangular film of the preceding system, all the films proceeding from the solid edges. Now, the angles of two contiguous side of a regular pentagon being 108° , and thus very near our angle of $109\frac{1}{2}^\circ$, it follows that the sides of the pentagonal film must be obviously straight, and this again experiment confirms. In the frame I employed, the length of the edges of the bases is five centimetres, and the height of the prism six centimetres; the sides of the pentagonal film are about two centimetres, and the eye can there distinguish no curvature. In this system, the films which proceed from the solid edges of the bases and attach themselves to the sides of the central pentagon appear plane, as they should do, since they rest on one hand upon the rectilinear edges of the bases, and on the other upon the visibly straight sides of the central film; it thence follows that the oblique liquid edges which pass from the summits of the bases to those of the central pentagon appear straight. As to the

* In this system, the liquid edges which proceed from the summits of the frame are in reality not altogether straight; but, as was said in the fifth series with reference to this same design, the curvatures of these edges are too feeble to be shown in the engraving.

triangular films which proceed from the solid vertical edges, they are strictly plane by reason of the symmetry of their position. The system in question is represented by Fig. 30.

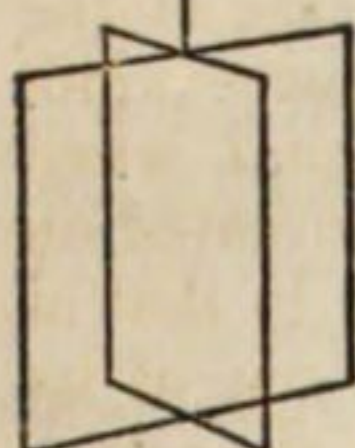
In the fourth place, if the frame is that of a regular hexagonal prism, the laminar system is analogous to the preceding in its general disposition, the central film, however, being hexagonal; but as the angle of two contiguous sides of a regular hexagon is 120° , that is to say, considerably superior to our angle of $109\frac{1}{2}^\circ$, the sides of the film in question must be sensibly curved towards the interior, and this also is shown in the realized system. The height of the frame which I have employed is to the distance of two opposite sides of the base, or, in other terms, to the diameter of the circle which might be inscribed at that base, as 7 to 6.

Fig. 30



§ 21. The facts I have stated (§ 16) to show that a system in which more than three films terminate under equal angles at the same liquid edge is in an unstable state of equilibrium, bear also upon the systems which present more than four edges terminating at the same time at the same liquid point. The instability might, therefore, be attributed to this latter circumstance, and it is requisite to determine whether it pertains exclusively to the one or the other, or only to their combination. In order to do so, let us take as a solid frame

Fig. 31

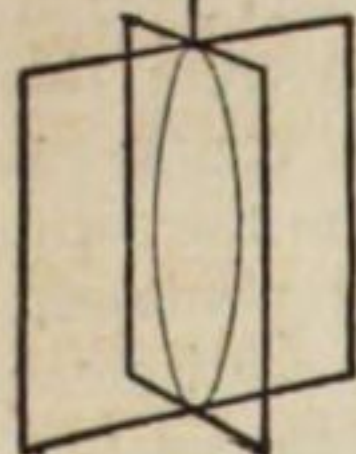


the assemblage of two rectangles which cut one another at a right angle in the middle of two of their opposite sides (Fig. 31.) The most simple laminar system which we can imagine in this frame would be composed of four plane films occupying, respectively, the four halves of the rectangles, and terminating at a single rectilinear edge $a b$, (Fig. 32,) which would join the two points of intersection of these rectangles. This system, by

Fig. 32



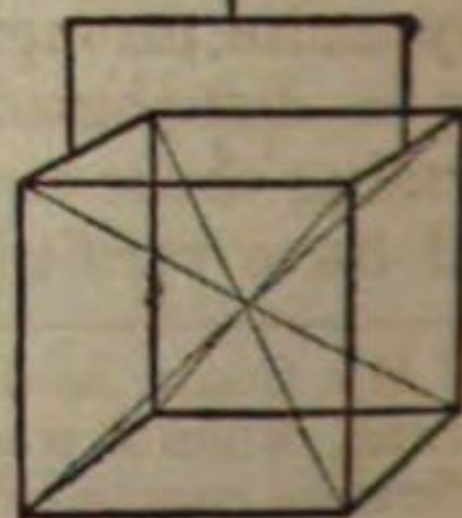
Fig. 33



reason of its symmetry, would evidently be a system of equilibrium, and would present no liquid point common to several edges; but the edge $a b$ would be common to four films. Now, when we withdraw this frame from the glyceric liquid, it is never found to be occupied by the system just indicated. In that which is realized, instead of the edge $a b$, there is (Fig. 33) a plane film terminated by two curved edges, to which the films proceeding from the solid edges attach themselves; films which, then, are necessarily curved. Here, it will be seen, each of the two liquid edges is common only to three films; and it must be inferred from this, that instability is really a property of laminar systems in which this condition is not fulfilled.

As to the second circumstance, I will first remark that if, in the cubic frame, we imagine a system of twelve triangular plane films proceeding, respectively, from twelve solid edges, and terminating at the centre of the frame, (Fig. 34.) this system, because of its perfect symmetry, will necessarily be a system of equilibrium, and it is readily seen that at each liquid edge only three films will terminate, which, moreover, will form among them equal angles; but there will be eight liquid edges terminating at the central point. Now, we know that with the glyceric liquid this system is not produced, and that we always obtain that of Fig. 28, in which only four liquid edges terminate at each of the summits of the central quadrangular lamina. From this fact we may conclude that instability pertains also to every system in which one liquid point is common to more than four edges.

Fig. 34



In describing (2d series, §§ 31 and 33) the operation by means of which the laminar system of the cube is produced with oil in the alcoholic liquid, it was said that we arrive, with certain precautions, but only during the action of the small syringe, at the system of Fig. 34; and here again is curious proof in support of what precedes. In effect, the extremity of the beak of the syringe, which occupies the centre of the system, constitutes, at that centre, a solid point, and we know that this condition suffices to maintain the stability; hence, as was said in the paragraphs cited, a change takes place when the syringe is removed. If it is withdrawn slowly, we observe the development of the quadrangular additional lamina of Fig. 28, and if quickly, the rapid formation of a small central mass of a certain thickness, and the system is still maintained; but we know (§ 16) that a small thickish mass can give stability to a system which would be unstable without its presence.

We can likewise obtain, and in a permanent manner, with the glyceric liquid, the system of Fig. 34, but it is by introducing into this system also a solid part; it suffices, in effect, to stretch from one summit of the frame to the opposite summit a very fine iron wire; yet, when the frame thus arranged is withdrawn from the glyceric liquid, the system which occupies it is not immediately that in question; it still contains a quadrangular lamina, but this is much smaller than that of Fig. 28, and is not placed symmetrically as regards the frame; it rests by one of its summits on the middle of the solid diagonal, but it is soon observed to diminish in extent, spontaneously, until it is completely annulled, so that the system then becomes that of Fig. 34. Here things rest, and the system remains perfectly stable in that state, at least when the decrease of the lamina is effected with sufficient slowness. But often this decrease is more rapid, and then another singular phenomenon presents itself. At the instant when the lamina is annulled, another much smaller is seen to be formed, situated on the opposite side of the solid diagonal, having its plane perpendicular to that of the first, and resting, no longer by a summit, but by the middle of one of its sides on the middle of the solid diagonal;* then this second lamina decreases and is annulled like the preceding. In this case, therefore, the system only attains its definitive form by a species of oscillation.

I shall indicate in another series the reason of the instability of systems in which more than three films terminate at a single liquid edge, and more than four edges at a single liquid point; but it will be seen, in the mean time, that stability must exist in the case of three films at the same liquid edge, and of four edges at the same liquid point; for three is evidently the smallest possible number of films terminating at one single edge, and there can be no difficulty in admitting that four is the smallest possible number of edges terminating at the same liquid point.

§ 22. The two laws which we have been discussing must now, I think, be regarded as well established for all laminar assemblages. Now, these laws conduct us to a very remarkable consequence. The froth which forms on certain liquids, as, for instance, on champagne wine, beer, soap-water agitated, white of egg beaten, &c., are evidently laminar assemblages, composed of a multitude of laminae or partitions, which intersect one another and confine small portions of gas. Consequently, though everything therein seems guided by accident, they must be subject to these same laws, hence their innumerable partitions necessarily unite throughout, three by three, under equal angles, and all their edges are so distributed that there are always four terminating at the same point and forming these equal angles.

I have verified these facts by the following experiment: The bowl of a pipe

* My frame having been accidentally put out of shape and then repaired, the second lamina, when it was produced, no longer placed itself in the manner above indicated. The difference proceeded, no doubt, from a slight irregularity existing in the frame, either before or after its reparation.

held a little obliquely was plunged to the bottom of a vessel containing glyceric liquid, and by continued blowing a numerous series of bubbles of quite large size were made to traverse the liquid. This occasioned, as is done by children with soap-bubbles, the formation of a partitioned mass rising above the edge of the vessel, a mass evidently of the same constitution with froth, but of which the different parts have much larger dimensions. Now, as far as the eye could penetrate, without embarrassment, into this system, it was observed that everywhere the same edge was common to only three partitions, and that there were never more than four edges terminating at the same point. As regards the equality of the angles between these edges, there were certain places where three of those which terminated at one point seemed to be nearly in the same plane; but, on looking more attentively, it was ascertained that these edges were strongly inflected in approaching their point of concourse.

The generation of such a mass, and consequently that of froth, is easily explained. The first bubbles of gas which reach the surface of the liquid give rise to spherical caps, which form groups like those with which we have been previously occupied, and presently the whole surface of the liquid is covered with them; the films produced by the subsequent gaseous bubbles necessarily lift up this first assemblage, by occasioning the formation of partitions beneath, so that, in a short time, there are two systems of superposed films, and the gaseous bubbles continuing to arrive, this assemblage is elevated in its turn, and so in succession, the whole arranging itself with more or less symmetry, according to the differences of volume of the successive gaseous bubbles, and the distribution of the points where they attain the surface of the liquid, and the slight edifice composed of partitions imprisoning within the spaces which they separate all the volumes of gas which respectively constituted the bubbles, acquires greater and greater height. If the bubbles are very minute, the partitioned edifice will be composed of parts too small to be in general distinguished by the eye, and in that case there is froth.

§ 23. Let us return now to the laminar systems of the frames and complete their study. We will first see how the films which proceed from each of the solid edges are generated, and for this let us take a very simple example. Suppose that one of the upper rings of § 14 of the 5th series, that is to say, a horizontal ring of iron wire, sustained, like our frames, by a fork, be plunged into soap-water or glyceric liquid, and then withdrawn with due quickness, while kept always parallel with the surface; as long as the distance from the ring to the plane of the liquid is very small, the liquid will rise a little, by capillary action, presenting, at the exterior and interior of the ring, two small surfaces with concave meridian curvatures. Now, it is easy to see that in proportion as the ring continues to ascend these two small surfaces will become more and more concave in a meridian direction. We know, in effect, that when we raise a solid disk previously brought into contact by its under face with the surface of a liquid capable of moistening it, the portion of this liquid raised by the disk above the exterior level soon presents, in the meridian direction, a concavity which increases in proportion as the disk rises. The same thing, then, must also take place with regard to that one of our small surfaces which faces outwardly, and it is clear that the other small surface, that, namely, which faces the interior space of the ring, must, for the capillary equilibrium of the little mass raised by this ring, undergo analogous modifications.

Our two small surfaces will continue, therefore, mutually approaching as the ring ascends until they nearly touch one another. But they cannot thus approach without expelling a portion of the liquid comprised between them; now, if the ascension of the ring is not too slow, the viscosity and cohesion of the liquid will act here as in the case of § 1, and for the same reasons there will be formed a film, which will extend between the small portion of liquid that remained suspended along the ring and the small annular mass elevated at the

surface of the liquid of the vessel. These considerations, it is clear, would apply also to the case in which the ring, while being withdrawn, is oblique or vertical instead of horizontal, and would alike apply to the case where the wire, instead of being circularly curved, should be arranged in any polygon: there would always be formed, by the same causes, a film between it and the surface of the liquid; if, then, we plunge one of our frames into soap-water or glyceric liquid, the iron wires which compose it will, in proportion as they afterwards emerge from the liquid, be connected with the latter by films, as experiment will evince.

§ 24. Let us examine, in the second place, the manner in which the films which are to constitute the system arrange themselves while being withdrawn and immediately after withdrawal. We will begin with the case of a prismatic frame which is withdrawn with the bases held horizontally. When the upper base emerges from the liquid, each of the solid edges of which it is composed will be followed, as just shown, by a film. Now, if the angle comprised between two adjacent lateral faces of the prism is equal or superior to 120° —that is to say, to one of the equal angles which three films terminating at the same liquid edge form between them, the films, which will proceed from all the edges of the base must, as we shall see, remain attached to the vertical solid edges so long as the inferior base shall not have emerged from the liquid.

Let us take as an example the frame of a regular hexagonal prism, a prism for which the angle of two adjacent lateral faces is 120° , and consider it when it is only partly without the liquid. Suppose, for an instant, that the films which proceed from the edges of the superior base re-enter towards the interior of the frame, in which case other films will necessarily proceed from the vertical edges to terminate at the liquid edges which will unite the former. All these films will be attached to the liquid of the vessel by small masses raised along their lower borders, (§ 3,) masses which will present, in the direction of their height, strong concave curvatures. Let us, at present, direct our attention to such of these small masses only as furnish the base of the films proceeding from the edges of the base of the frame; if these masses are curved in the direction of their length, this longitudinal curvature will always, as is readily understood, be very feeble in relation to the above transverse curvatures, so that the influence of these last will much predominate; it will be necessary, therefore, for the capillary equilibrium of these small masses, that the transverse curvatures of their two surfaces should be sensibly the same, which evidently requires that the films which rest on their crests should terminate there in a direction very nearly vertical. The films in question, those, namely, which proceed from the edges of the base, must consequently be inflected in descending towards the liquid, and thus will be, in the direction of their height, convex towards the interior of the figure. But as they will be in contact by their two faces with the open atmosphere they can exert no pressure on the air, and thence it results (5th series, § 12) that their mean curvature will be null, or, in other terms, that at each of their points, the curvatures, in two rectangular directions, will be equal and opposite; therefore, since the films in question are convex in the direction of their height, they will be concave in the direction of their breadth. Now, for the two-fold reason of this concavity and of their re-entering direction towards the interior of the frame, our films will necessarily form between them, two by two, angles superior to those of the faces of the prism, and consequently superior to 120° , a thing which we know to be impossible; hence, these films must remain, as I before stated, adherent to the lateral solid edges so long as the whole frame is not out of the liquid. This deduction is fully confirmed by experiment: when the frame of a regular hexagonal prism is withdrawn, in the position indicated, from the glyceric liquid, we simply obtain, until the lower base has emerged, plane films occupying all the lateral faces.

The thickness of the wires, a thickness which, in my frames, approximates to

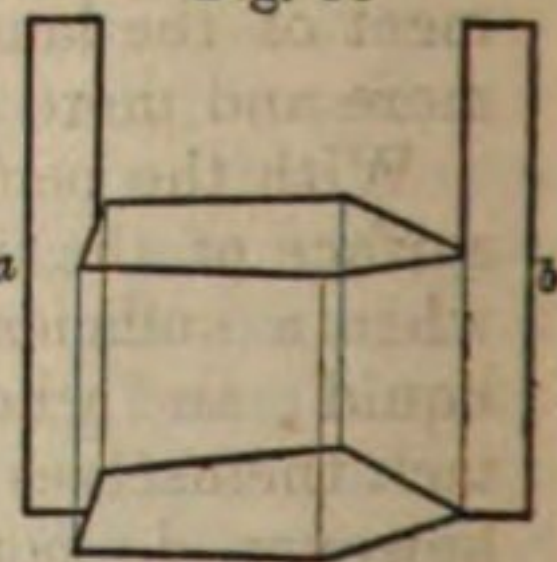
a millimetre, might seem sufficient of itself to establish independence among these films, but this thickness is here of no importance. I have caused a hexagonal prismatic frame to be constructed in which the lateral edges were formed of mere hairs, and yet everything has taken place in exactly the same manner. In this frame, whose arrangement it would be difficult to represent by an engraving, the upper base is raised by small springs, in such a way that the hairs, which are elongated in the liquid, shall continue to be stretched.

§ 25. But it may be readily conceived that in the case of a frame of which the bases have less than six sides the incidents will be different, for then the lateral faces making between them angles of less than 120° , the films which proceed from two adjacent edges of the superior base, and which, along the corresponding vertical solid edge, would be in communication by the medium of the liquid which moistens that edge, must tend to detach themselves from this same edge, and be both directed towards the interior of the frame, to the end of re-establishing between them the angle of 120° ; then, also, they will develop a third film proceeding from the vertical solid edge in question, in such manner that these films shall be united by an oblique liquid edge proceeding from the point of junction of the three solid edges. This also experiment verifies: when we withdraw from the liquid a prismatic frame with square base or the cubic frame, we see the films assume a re-entering direction as soon as the superior base has emerged, and the effect is still more decided with the frame of the equilateral triangular prism; it will be observed, at the same time, that these films conform to what I have advanced in the preceding paragraph—that is to say, they become inflected in order to terminate at the surface of the liquid in a vertical direction, and that they are concave in the direction of their breadth.

As regards the regular pentagonal prism, for which the angle of two adjacent lateral faces is 108° , and consequently little inferior to 120° , it may be conceived that the tendency of the films to re-enter must be feeble, and that hence the thickness of the wires of which the solid edges of my usual frames are formed, suffices in this case to establish independence between the films: thus, with the pentagonal frame of Fig. 30, we obtain, while withdrawing it, only plane films in the lateral faces; but I have caused to be made a frame in which the lateral edges were of very fine iron wire, and then the films re-entered; but, as might be expected, they re-entered much less than in the two preceding frames. This frame with fine lateral edges is represented by Fig. 35. The superior base is sustained by two handles *a* and *b*, by which the frame is to be held in immersing it.

§ 26. Let us now see how these different systems are completed, when we continue to raise the frames. We will take, first, the case of the hexagonal prism, and suppose that the frame has the relative dimensions indicated at the end of § 20. When the inferior base rises from the liquid, a film will be formed, as with the ring of § 23, extending from that base to the surface of the liquid, a film which will continue to become thinner from above downwards. If we still raise the frame, a point will soon be reached at which the equilibrium of this film will be no longer possible, for it then spontaneously and rapidly contracts, closes in separating from the liquid of the vessel, and becomes a plane film in the inferior base of the prism. But this plane film making right angles with those which occupy the lateral faces cannot, according to what has been said in the preceding paragraph, persist in this manner; things must so shape themselves that it shall make with the lateral films angles of 120° . Now, this is effected in the most simple manner: the plane film in question ascends into the interior of the frame, diminishing at the same time in extent, as if drawing to itself the lateral films, while other films proceeding from each of the vertical wires attach themselves to these lateral ones along the liquid edges which unite them two by two, and equilibrium

Fig. 35



is established when the central film has attained half the height of the frame, because then the whole is symmetrical; we have thus the system spoken of at the end of § 20.

It will be understood that in this system the oblique films, which direct themselves towards the central film, can only form, two by two, angles of 120° on the condition of being convex, in the direction of their breadth, towards the interior of the figure, which again implies the re-entering curvature of the sides of the central film; but, by reason of the necessity of a mean curvature null, this convexity requires that the films in question should be concave in the direction of their height; in this way all the laws are satisfied, and in the system realized these two opposite curvatures are verified in the oblique films. As to the central film and the films which proceed from the lateral solid edges, these are necessarily plane, because of their symmetrical position in relation to the others. In this system it is to be remarked that the oblique liquid edges which pass to the summits of the central film do not proceed exactly from the summits of the two bases, but from points situated at a small distance from these last summits, on the lateral solid edges; of this we shall see the reason in the sequel.

§ 27. We pass now to the cases of the pentagonal prism with fine lateral edges, the quadrangular prism or cube, and the triangular prism, cases in which the films proceeding from the edges of the superior base take, as has been seen, a re-entering direction when that base emerges from the liquid. When these films begin to show themselves the small masses raised at their lower borders will necessarily describe on the surface of the liquid a polygon of the same number of sides with the solid base—that is to say, a pentagon, a quadrilateral, or a triangle, according to the frame employed. But, as the films in question are vertical at their lower part and are joined under angles of 120° , it is necessary that the sides of the above polygons should also form between them angles of 120° , which evidently requires that they be convex towards the exterior; these sides must, moreover, partake the horizontal curvature of the films, a curvature which we know to be concave towards the interior of the figure, and consequently convex towards the exterior. This convexity of the sides of our polygons will be slight for the pentagon, more decided for the quadrilateral, and still more so for the triangle. All this likewise is found to be verified by experiment.

These first facts being established, we will follow separately the development of the laminar system in each of the three frames, in proportion as it is more and more elevated.

With the pentagonal frame, the curvilinear pentagon, which takes form at the surface of the liquid, at first undergoes a slight contraction, but again enlarges when a sufficiently considerable part of the height of the frame is out of the liquid; and when the inferior base attains the surface the re-entering films attach themselves by their lower borders on the sides of that base. These films, however, do not then occupy the lateral faces of the prism; they slightly re-enter, in the direction of their height, towards the interior of the frame, so as to be united, two by two, by liquid edges, each of which constitutes an arc of feeble curvature resting by its two extremities on those of a lateral solid edge. Finally, some short time after the emergence of the inferior base, the phenomena are completed as in the frame of the preceding paragraph—that is to say, the film produced between the base in question and the liquid occupies this base under a plane form, and then ascends rapidly, drawing to itself, at the same time, the other films, so as to give, in fine, the system of Fig. 30.

With the frame of the quadrangular prism, the curvilinear quadrilateral formed at the surface of the liquid is soon annulled, and is replaced by a small horizontal liquid edge, from the extremities of which proceed two descending liquid edges, which continue to diverge from one another; these three edges limit a vertical plane film parallel to two of the faces of the prism, and attached by other films to the

solid edges. No essential change takes place when the elevation of the frame is continued; the plane film just mentioned increases in height and becomes broader at its lower part, until the inferior base of the prism begins to appear at the surface of the liquid; at this time the two descending liquid edges rest by their extremities on the middle of two opposite sides of that base; after the complete emergence of which the film which occupies it is rapidly transformed into four oblique films, two trapeziums, and two triangles, which complete the system. In the particular case of the cube we have thus the system of Fig. 28. If the height of the frame be greater than the length of the sides of the bases, the oblique films which rest on these last are identically the same as for the cube, and the films proceeding from the lateral edges as well as the central plane film have simply more height.

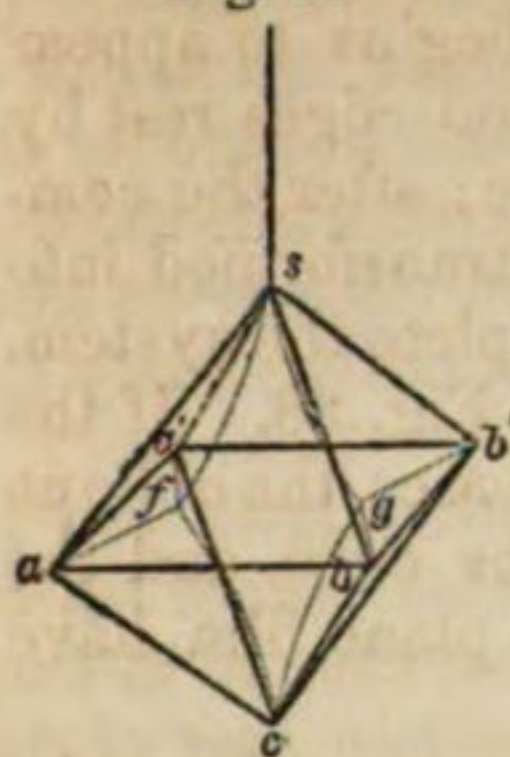
Lastly, with the frame of the triangular prism, the curvilinear triangle at the surface of the liquid decreases more rapidly, and disappears when the frame has emerged by a very small quantity, so that the triangular pyramid which is to rest on the superior base in the definitive system is already completed; if the frame be still raised, we see a vertical and straight liquid edge extend itself from the summit of this pyramid to the surface of the liquid, an edge which is common to the three films proceeding from the lateral solid edges. This state of things continues while the elevation of the frame proceeds, the three films and the vertical liquid edge merely go on increasing in height until the emergence of the inferior base; then the film which presents itself in this base is instantaneously converted into the second triangular pyramid, which thus completes the system of Fig. 25; it should be understood, however, that the frame is supposed to have sufficient height not to give the system of Fig. 29.

§ 28. Let us take now a frame which is symmetrical around an axis passing by a summit, such as that of a regular pyramid, a regular octahedron, &c., and withdraw it by this summit. It is evident that in this case there could not be formed films occupying the faces which terminate at the summit in question, for the space which they would leave between themselves and the liquid would be void of air. It is absolutely necessary, therefore, that the films proceeding respectively from each of the solid edges should be directed towards the interior of the frame.

If there are only three solid edges meeting at the summit in question, and symmetrically disposed, as in the tetrahedron, or the cube when withdrawn by a summit, it is clear that the films proceeding from these three solid edges will be united by a single liquid edge descending vertically from the solid summit to the surface of the liquid of the vase, and this, in fact, is what takes place. With the regular tetrahedron this state of things continues until after the withdrawal of the solid base, when the system completes itself in the same manner with that of the triangular prism, and yields the result shown in Fig. 24. If there are more than three solid edges terminating at the summit which we withdraw, it follows necessarily, from the fact of the instability spoken of in §§16 and 21, that additional films should be formed. Let us take as an example the regular octahedron. It will readily be conceived that the films proceeding from the four solid edges will unite, not by a single liquid edge, but by two liquid edges proceeding from the summit and bounding a vertical auxiliary film, so that at each of these last edges terminate three films, forming between them equal angles. The auxiliary film is destined to form, in the complete laminar system, the superior quadrilateral, (Fig. 26.) Until the square, a common base of the two pyramids which constitute the octahedron, emerges from the liquid, the assemblage of films preserves the same arrangement; then, while the withdrawal of the frame proceeds, modifications are produced, which it

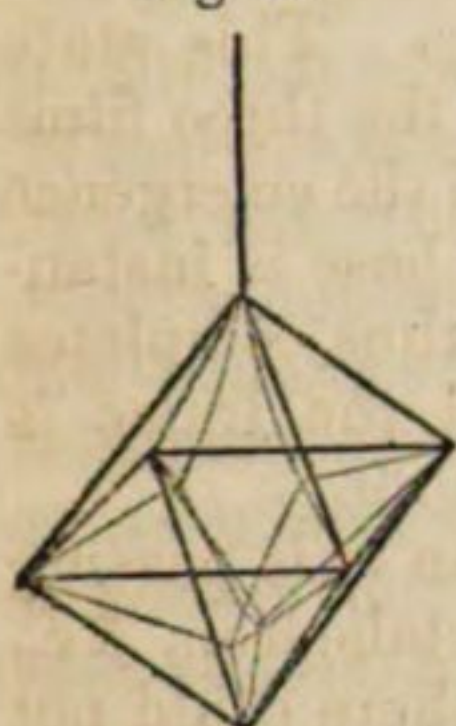
would detain us too long to describe, and in consequence of which the system tends towards the form represented at Fig. 36, where the two faces abc and $a'b'c$ are each occupied by a plane film. This form is completely attained at the moment when the inferior summit of the frame emerges from the liquid, but a change speedily occurs, and the system takes the form of Fig. 26. Although this change is very rapid, we may yet, by proper attention and by repetition of the experiment, observe how it is produced: the two films which occupied (Fig. 36) the faces abc and $a'b'c$ rise towards the interior of the frame by turning around the solid edges ab and $a'b'$, and at the same time there is developed from the inferior summit a quadrilateral, at first very small, but which increases until its superior summit at-

Fig. 36



tains the centre of the frame, and which then constitutes the inferior quadrilateral of the definitive system; at the same time the summits f and g of the curvilinear quadrilateral $sfgc$ ascend by a certain quantity, this quadrilateral shrinks, its edges become straight, and it finally forms the superior quad-

Fig. 37



rilateral of the same definitive system. Fig. 37 represents the phenomenon in course of formation, at the moment when the quadrilateral, which is extending, has acquired half of its ultimate height. It will be easily conceived from this drawing how the four other quadrilaterals of Fig. 26 are generated.

In order that all these phenomena should, with almost entire certainty, be produced, it is necessary that the frame should be withdrawn quite vertically; it is further necessary that this frame should be well constructed, that the iron wires which compose it should be of the least possible thickness, and, above all, that at the summits of the octahedron they should unite in the neatest manner, at least on the side which faces the interior of the frame; when this is not the case, the laminar figures obtained are often irregular. It should be added that the frame in question sometimes gives, when it is a little inclined in being withdrawn from the liquid, a system wholly different from that of Fig. 26, regular like it, but formed of curved films. This second system contains in the middle an hexagonal film, placed parallel to two faces of the octahedron, and having its sides slightly re-entering (§ 20;) these sides are attached to the summits of the above two faces by triangular films, and to the edges of these same faces by trapezoidal films; moreover, the summits of the film in question are attached by triangular films to the other solid edges.

The different examples which I have given in detail will suffice to make it understood how laminar systems are generated, and to show that theory can render an account of all the particulars which this generation presents.

§ 29. In § 19, of the 5th series, I stated the laws which govern the laminar systems of polyhedral frames, when these systems are formed. Of these laws, which are five in number, three have already been discussed, (§§ 16 to 23;) they relate to the number of films terminating at the same liquid edge, and the equality of the angles between these films; the number of liquid edges terminating at the same liquid point, and the equality of their angles; lastly, the formation of a film proceeding from each solid edge. Let us now consider the two other laws.

One of these rests upon the fact that if care be taken that there shall be no bubble of air at the surface of the liquid of the vessel before the frame is plunged therein, the laminar system will present no space closed on all sides by films, and that hence all the films will be in contact by their two faces with the ambient air. In effect, if, while the frame is being withdrawn, the system, before it undergoes the rapid modification which gives to it its final arrangement, contained a space closed on all sides by films, this space must have originated

during, and have increased in proportion to the elevation of the frame; now this is impossible, for the air which must fill it would have had no passage by which it could have entered; for the same reason the system, at this period of its generation, could present no space closed in part by films and in part by the surface of the liquid; in fine, when the rapid modification is effected, the film or films which then ascend into the system finding no space of the second kind to complete its laminar closure, the complete system will necessarily satisfy the law in question.

The last law is the following: when the conditions of other laws can be fulfilled by plane surfaces, the films take that form; when this cannot be, all the films or several of them become more or less curved, but always in such manner as to constitute surfaces of mean curvature null. The first part of this law is a matter rather of evidence than demonstration; the plane being the most simple surface, nature, which always proceeds by the least complicated methods, will not unnecessarily give curved forms to the films. The second part of the law follows from the first, and I have already made application of it in what I have previously stated respecting the laminar systems of prismatic frames.

It is proper that a reason should be here given for the special fact that the laminar system of the regular octahedron is formed of curved films when it is obtained with oil in the alcoholic liquid. We have seen (§ 16) that in this mode of producing laminar systems the thickness of small remaining masses has great influence. Now, in the octahedral frame, when, by the gradual withdrawal of oil, the point has been reached at which the system is spontaneously modified, since the masses of junction have still a considerable thickness, and the oil which composes them accumulates, in the definitive system, around the points where four liquid edges would terminate, so as to form masses much thicker than the edges in question, and since, in fine, several of these edges are sufficiently short for the masses which occupy their extremities to be in communication of curvature with one another, it will be readily conceived that there must result from thence an influence on the form of the edges and of the films; and it cannot be doubted, that if we might, without occasioning the rupture of the system, sufficiently reduce the thickness of the masses in question, all the films would become plane.

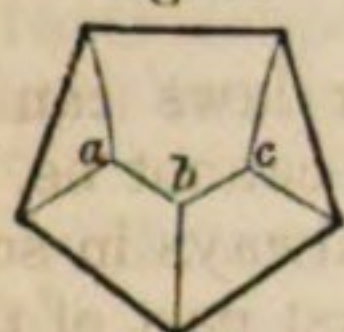
§ 30. To return to the systems of the prismatic frames: Besides the facts already stated, these systems have presented others equally curious, which I here propose to notice.

The system obtained with the pentagonal frame of Fig. 30 is, as was seen, (§ 20,) composed of films obviously plane. Now, if we consider the oblique films which proceed from two homologous sides of the two bases to unite at one of the sides of the central pentagonal film, and recollect that these two oblique films must form between them an angle of 120° , it will be evidently seen that, for bases of given dimensions, an augmentation in the height of the prism involves a diminution in the extent of the central pentagonal film, and that there is a limit of height beyond which the existence of this film is impossible. It will be found, without difficulty, that the limit in question corresponds to the case in which the ratio between the height of the prism and the diameter of the circle which might be inscribed at the base would be equal to $\sqrt{3}$, that is to say, to 1.732.

It might naturally be asked, What becomes of the laminar system when this limit is overpassed? In order to know this, I had a frame constructed in which the height was about $2\frac{1}{2}$ times the diameter of the inscribed circle, and it yielded me a singular result. When it is withdrawn from the glyceric liquid, as the lateral edges are of ordinary iron wire, all the lateral faces are at first occupied by plane films, and after complete emergence, a plane film is formed also in the inferior base, then ascends among the others, forming a pentagon which

continues decreasing, everything occurring as with the frame of Fig. 30; but the pentagonal film decreases much more rapidly, then disappears, and at the instant the system undergoes an abrupt change, assuming an odd arrangement which it would be difficult to represent clearly in perspective, but of which I shall still attempt to give an idea. On the two bases respectively rest two identical assemblages, composed of five curved films; one of these assemblages is

Fig. 38



represented in projection on the plane of the base by Fig. 38. It will be seen that there are in each of them a pentagonal film, two quadrangular and two triangular films. These two assemblages are connected with each other by films which proceed from the five lateral edges of the prism, and by two other intermediate films, whose direction is also in the length of the frame,

and which proceed from the liquid edges $a b$ and $b c$ of one of these assemblages to terminate at the homologous liquid edges of the other. There is no need of remarking that the same thing would occur if, instead of overpassing the indicated limit, we should simply attain it—that is to say, if we gave to the prism the height which would precisely correspond to the annulling of the pentagonal film; in effect there would then be ten liquid edges terminating at the centre of the system, in the same liquid point, and consequently equilibrium would be unstable.

§ 31. Although, in the laminar systems of the prisms with a greater number of sides, the oblique films must be considerably curved, it appeared to me probable that there would also be, for each of these prisms, a limit of height beyond which the system would no longer comprise a central polygonal film, and that this limit would differ little from that pertaining to the pentagonal prism. To ascertain this, I tried first the hexagonal prism, with a frame whose height was also about $2\frac{1}{2}$ times the diameter of the circle which might be inscribed at the base. Now, to my great surprise, a central hexagonal film was still formed, though much smaller than with the frame of § 20; but the system had undergone a modification which rendered possible the existence of this film. The points of the solid lateral edges from which proceeded the oblique liquid edges (§ 26) were situated much further from the summits of the bases, so that the arrangement was very nearly such as if, in reality, the frame had been shortened. In this arrangement, therefore, the films proceeding from the sides of the two bases remain, to a sufficiently great distance from the latter, adherent to the solid lateral edges, whence it follows that the assemblage should be considered as an imperfect laminar system, resulting from a conflict between the tendency of the films to occupy the lateral faces of the prism, and the kind of traction which these films undergo on the part of the hexagonal film which ascends among them. I say imperfect, because the films which proceed from all the sides of the same base are, in the parts which remain attached to the lateral solid edges, separated from one another and rendered independent by these edges.

§ 32. This becomes more evident with prisms the number of whose lateral faces exceeds six; then the angle of two adjacent lateral faces being superior to 120° , the films have more tendency to occupy all these faces, and the portions which remain attached to the lateral solid edges are, in effect, much more extended. For example, with an octagonal frame in which the ratio between the height and the diameter of the circle inscribed at the base is nearly the same as in the above frames, the central octagonal film, instead of being small, is, on the contrary, very great, and the two oblique liquid edges proceeding from any one of its summits attach themselves to the corresponding solid lateral edge, at two points, of which the distance is but about the sixth of the length of that edge, and consequently a little less than the half of the diameter of the circle inscribed at the base. In this case, therefore, the films which proceed from two homologous sides of the bases in order to direct themselves towards the central octagonal film, only abandon the solid lateral edges on approaching the middle of the

height of the frame, and until then they occupy, under a perceptibly plain form, the lateral faces of the prism.

In the hexagonal frame of the preceding paragraph, the distance between the points where two liquid edges proceeding from one of the summits of the central film attach themselves to the same lateral solid edge is about double the diameter of the inscribed circle. In the octagonal frame, as we have just seen, it is somewhat smaller than the half of that diameter; in a heptagonal frame it is, as might be expected, intermediate between those two values, and equal, nearly, to three-fourths of the same diameter. I have tried, also, a decagonal frame, and in this the distance in question is but the sixth of the diameter.

The facts just recited would constitute an exception to our law, according to which one film ought to rest on each of the solid edges of the frame, since, reckoning from either base to the points at which the oblique liquid edges arise, two films are attached to each of the lateral solid edges; but, as I have shown, the laminar systems in question are imperfect systems. These facts are not owing to the thickness of the metallic threads: they still present themselves when the lateral edges of the frames are of the finest iron wire; only, in this case, the separation of the points of attachment of the oblique liquid edges is a little greater.

§ 33. Having afterwards employed an octagonal frame of which the height was a third of the diameter of the inscribed circle, I found that although, according to the value before given for the separation of these points of attachment, all of them should have been at the summits of the prism, it was not so: the points in question were still at a certain distance from the summits, and their separation was not more than the sixth of the diameter of the inscribed circle; hence the octagonal film was still enlarged. The same effect was produced with a heptagonal prism of which the height was half the diameter of the inscribed circle—that is to say, less than the separation of the points of attachment as previously estimated in regard to prisms of that number of sides. The same thing occurs in the hexagonal prism, since with a frame of this kind, (§ 26,) the height of which was but $1\frac{1}{6}$ of the diameter of the inscribed circle, the points of attachment of the oblique liquid edges were still found to be a small distance from the summits.

§ 34. In order to discover the cause of these last facts, let us consider an octagonal or heptagonal prismatic frame sufficiently high for the films which proceed from the sides of the bases to occupy under a plane form considerable portions of the lateral faces. At the places where these films quit the faces in question to direct themselves towards the sides of the central polygonal film, they are necessarily convex towards the exterior in the direction of their length; but in consequence of the necessity of a mean curvature null, it is requisite that at these same places they should be concave towards the exterior in the direction of their breadth. If, then, we conceive the frame to be traversed by two planes perpendicular to its axis and passing by the two series of points where arise, on the lateral solid edges, the oblique liquid edges, these two planes will cut the films by arcs concave towards the exterior, and if we imagine these arcs solidified, the equilibrium of the system will not be disturbed. According to this, if we constructed a frame having for its height the separation of the points of attachment of the oblique liquid edges on the same lateral solid edge, and gave to the wires which form the sides of the bases the curvature of the above arcs, it is clear that the laminar system realized in this frame would have its oblique liquid edges proceeding exactly from the summits; but with a frame of that height or of a less height and the sides of whose bases are straight, the condition relative to the transverse curvatures of the re-entering films, and consequently to the form of equilibrium of these films, can evidently not be satisfied unless the points of attachment of the oblique liquid edges be placed at a certain distance from the summits on the lateral solid edges.

§ 35. If, in the different systems which we have been studying, we compare the central polygonal films with one another, it will be seen that the curvature of their sides goes on increasing from the hexagonal film to the decagonal film, a circumstance which constitutes new facts to be added to those of § 20 in confirmation of the law relative to the angles under which the liquid edges terminate at the same liquid point. The transverse curvature (§ 34) of the oblique films which are directed towards the sides of the central polygonal film being connected with the curvature of these sides, it must be less in the heptagonal prism than in the octagonal, and still less in the hexagonal; it is because of the weakness of the curvature in question in the last prism, that this yields, when it has not too much height, a laminar system almost perfect, with its hexagonal film.

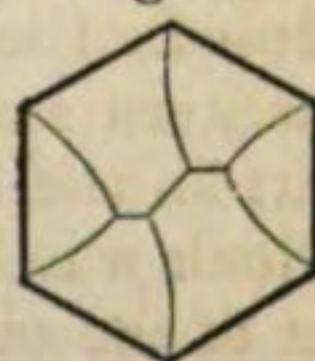
§ 36. In reflecting on the generation of laminar systems, the inquiry has struck me whether there might not be realized, at least in the hexagonal prism and with the frame of § 31, a system devoid of the central polygonal film by withdrawing the frame from the glyceric liquid in such manner that the axis of the prism should be horizontal instead of being vertical, as in the preceding experiments. I have consequently so arranged the fork as to be able to operate in that way, and with complete success: I have obtained, indeed, two different systems, according as the frame was withdrawn in such a way that two lateral edges emerged at the same time from the liquid, or first one and then simultaneously the two neighboring ones. These two systems are of the same kind with that which is realized in a pentagonal frame sufficiently high, (§ 30;) that is to say, they are composed of two assemblages of oblique curved films connected with one another by other films directed in the length of the prism. The projection of one of these assemblages on the plane of the base is represented in the

Fig. 39



first mode by Fig. 39, in the second by Fig. 40.

Fig. 40



Nor is this all: to produce the first of these two systems, it is necessary, when half of the frame has been withdrawn from the liquid, to finish the operation with very great slowness; when we operate without this precaution, there is formed

a third system of still another kind, a system of which, notwithstanding its simplicity, it is quite difficult to give a clear idea either by description or drawing: it contains two curved hexagonal films, resting, respectively, by one of their sides, on one of those of the bases, and directing themselves obliquely towards the interior of the frame; the other sides of these hexagons have, as usual, a concave curvature; the curved sides of each of these same hexagons are connected with the corresponding sides of the neighboring base and with the homologous sides of the other hexagon by curved films; lastly, at the liquid edges which unite these last films two by two, terminate other films proceeding from the lateral edges of the frame. The sides of the bases on which rest the two hexagonal films pertain to the face of the prism which first emerged from the liquid.

The heptagonal prism yields analogous results, with a frame having its dimensions in the same ratio; only, at first, the three systems are imperfect, in the sense that, in the two former, the films which proceed from the sides of the bases remain, to a certain distance from the summits, adherent to the lateral solid edges, and that, in the third, the films which pass from the curved sides of one of the heptagonal films to the homologous sides of the other are attached, for the greatest part of their length, to the lateral solid edges, presenting, throughout this extent, a form decidedly plane; moreover, by a new singularity the system furnished by the second method is unstable; when barely formed, it undergoes a spontaneous modification: the two assemblages situated near the bases become elongated, at first slowly, then more and more rapidly, reach one another, and immediately there appears the imperfect system with the hepta-

gonal film at the middle. The projection on the plane of the base of one of the assemblages of the system due to the first method is represented by Fig. 41; the projection referable to the second method could not be delineated, because the spontaneous modifications undergone by the system prevent it from being distinctly observed. The facts just described, joined to that stated at the end of § 28, show that with certain frames the results differ according to the manner in which these frames are withdrawn from the glyceric liquid.

Fig. 41



Thinking that the instability of the second system of the heptagonal frame might be occasioned by a want of sufficient length in the frame, I caused another to be constructed in which the length was double the diameter of the inscribed circle; but nothing was gained thereby, besides that the first two systems were produced with more difficulty, and it was the third which was almost always obtained, the system, namely, which contains two oblique heptagonal films proceeding respectively from one of the sides of the bases. Indeed, with a frame still more elongated, it was only this last system which resulted. As regards the octagonal prism, whatever the ratio between its length and the diameter of the inscribed circle, it yields no other than the imperfect systems with the octagonal film in the middle, or with two oblique octagonal films, and again this last is the only one realized when the ratio is sufficiently great.

§ 37. I have said (§ 16) that with the pyramid with square base which had served for the experiments of the second series, the laminar system always presented a little irregularity. This consists in the fact that one or more of the four oblique liquid edges directed towards the summits of the base do not exactly terminate at those summits. I am now able to indicate the cause: if we inquire the height of a quadrangular pyramid in which two adjacent triangular faces make between them an angle of 120° , it will be found that this height is half the side of the base; when we employ, then, a frame having this height or a less one, it is clear that the films will simply occupy the four triangular faces, and this is verified by experiment, such a frame yields nothing else in whatever manner it be withdrawn from the liquid. Now, in the frame of the experiments of the second series, the length of the side of the base was 67^{mm} , and the height of the pyramid 50^{mm} ; this height, therefore, was but about three-fourths of the length of the side in question; but, in such a pyramid, the films which proceed from the sides of the base must have but a feeble tendency to separate from the oblique solid edges, and it is to be inferred that they may continue to adhere to them for a certain extent.

§ 38. It has just been seen that with a quadrangular pyramid whose height is at most equal to half the side of the base, none but plane films occupying the triangular faces are ever obtained; but an assemblage of this kind does not constitute a laminar system, for all these films are rendered independent of one another by the intermediate solid edges.

From all that has been stated since § 32 may evidently be deduced the following conclusion: When, in a polyhedral frame, there is a continued and recurring succession of identical adjacent faces forming between them angles greater than 120° , and all arranged after the same manner as the succession of lateral faces of a prism, heptagonal, octagonal, &c., or as that of the lateral faces of a pyramid, hexagonal, &c., that frame gives an imperfect laminar system—that is to say, one containing films which, through a portion of their extent, adhere at the same time to two solid edges; or else it gives no system—that is to say, all the faces but one are simply occupied by plane films; I say but one, for, in this case, it is necessary that one face should remain open to allow the introduction of air; in the quadrangular pyramid mentioned above, for instance, the face which remains open is the base.

We may make an interesting application of this principle. Among regular polyhedrons, it has been seen that the tetrahedron, the cube and the octahedron furnish perfect laminar systems, and, in these three polyhedrons, the angle of two adjacent faces is, in effect, less than 120° ; there remain the dodecahedron and the eikosahedron; now, in the first of these the angle of two adjacent faces is but 116° and a fraction, and consequently less than 120° , while in the second it is 138° and a fraction; it might be seen, therefore, that the dodecahedron would give, like the preceding regular polyhedrons, a perfect laminar system, but that such would not be the case with the eikosahedron, and this is confirmed by experiment; with the eikosahedron, in whatever manner the frame be withdrawn, none but plane films are ever in nineteen of the faces, and the twentieth is void. As to the system of the dodecahedron, there would be difficulty in describing or drawing it.

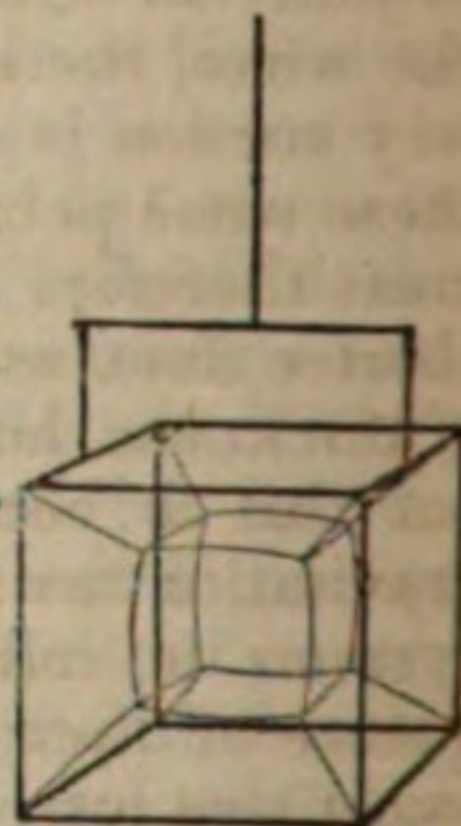
§ 39. In order to give more precision to these results, I would say: 1st. The frame of any polyhedron in which the dihedral angles are inferior to 120° gives a perfect laminar system; such are the frames of the tetrahedron, the cube, the octahedron, the dodecahedron, the prisms whose number of lateral faces is less than six, &c. There are, however, some rare exceptions, as that presented by the frame of a quadrangular pyramid whose height does not much exceed the half of a side of the base. 2d. The frame of any polyhedron in which all the dihedral angles are superior to 120° gives a laminar system null. Examples: The frame of the regular eikosahedron, that of the assemblage of two hexagonal pyramids, or one containing a still greater number of sides, united by their bases, and such that at the edges of the common base the dihedral angles exceed 120° , &c. Nevertheless, when all the dihedral angles but a little exceed 120° , we obtain, in certain cases, a real laminar system; this, for instance, occurs with the frame of the polyhedron formed by cutting down the summits of a cube by equilateral sections which join one another, so that there shall only be triangular faces and square faces. But in this polyhedron all the dihedral angles are but about 125° ; moreover, the real and symmetric laminar system is produced with difficulty, and only when the frame is withdrawn by a triangular face; when withdrawn by a square face it always yields a system null. 3d. A frame of which the dihedral angles are some inferior and other superior to 120° , but in which the faces which comprise between them these last angles are identical, disposed in the same manner, and form a continuous and recurring succession, gives an imperfect laminar system or a laminar system null: for instance, the system is imperfect in the frames of prisms the number of whose sides exceeds six, in that of a hexagonal pyramid when withdrawn from the liquid by its summit, &c.; it is null in that of a quadrangular pyramid whose height is less than half the side of the base, in that of an hexagonal pyramid when withdrawn from the liquid by its base, &c. 4th. When the frame falls within neither of the preceding categories, the laminar system is sometimes perfect, sometimes imperfect, sometimes null. For example, we have a perfect laminar system with the frame of a prism having for its base a lozenge of which the two obtuse angles exceed or equal 120° ; we have, as has been seen, an imperfect system with the frame of an hexagonal prism sufficiently tall when it is withdrawn with the axis vertical; with a frame representing the assemblage of two pentagonal pyramids united by their bases and sufficiently tall for the dihedral angles, in each of them, to be less than 120° , while the dihedral angles which have for edges those of the common base are greater than 120° , we have a system null when it is withdrawn with the axis vertical, and an imperfect system with the axis horizontal, &c.

§ 40. Let us indicate some other curious modifications of our laminar systems. In the first place, we know that in the system of the cubic frame (Fig. 18) the central quadrangular lamina is parallel to two opposite faces of the cube, but, because of the symmetry of the frame, it is evidently indifferent, as

concerns equilibrium, whether this parallelism exists in relation to one couple of faces or to another; the lamina may, therefore, equally occupy three positions, and it may readily be supposed that a slight cause suffices to decide its destination. Thus, when the frame is withdrawn from the glyceric liquid, the lamina in question is found sometimes parallel to the anterior and posterior faces, sometimes parallel to the faces of the right and left, and it sometimes happens that it is even placed horizontally. Further, it may be made to pass at will, and several times in succession, from one of these three positions to another; for this purpose it is sufficient to blow very gently on one of its edges by the face of the frame on the side of which this edge presents itself; the lamina is then seen to shrink in the direction of the blowing, to be reduced to a simple line, then to be reproduced in its new position. These last phenomena were pointed out to me by M. Van Rees, who was so obliging as to repeat my experiments in Holland.

In the second place a laminar system may be forced to deviate from our law according to which it should not include any portion of air imprisoned on all sides by films, and then, in several frames, we obtain by proper management new and very pleasing results. The process, which was likewise indicated to me by M. Van Rees, consists in producing at first the ordinary system, then again immersing the inferior face of the frame to the extent of some millimetres, and withdrawing it anew; there is thus formed, in this face, a plane film which confines the air between it and the oblique films proceeding from the sides of this same face, and which, immediately climbing up between these oblique films, drives the portion of air before it, giving rise to a new system, which is symmetrical when circumstances will permit. For instance, with the cubic frame, the new system, which is represented at Fig. 42, contains in its middle a laminar cube attached by its edges to the films proceeding from the solid edges; only the edges, and consequently also the faces of this laminar cube are slightly convex, which is easily explained by the law relating to the angles formed by liquid edges with one another. So, too, with the frame of the tetrahedron, the new system contains in its midst a laminar tetrahedron with convex edges and faces. Analogous results are obtained with the frame of the pentagonal as well as that of the hexagonal prism; but that of the triangular prism gives a non-symmetrical figure. That of the octahedron, if one of its faces be re-immersed parallel to the surface of the liquid and be withdrawn in the same way, furnishes a symmetrical result, in which, however, the central laminar octahedron has four faces triangular and the four others hexagonal. These systems are evidently mixed ones, in which a part of the films is of mean curvature null, while the other is of mean curvature finite and constant. Again: if, after having realized one of these mixed systems, we break one of the films which compose the central polyhedron, the whole is seen to return instantly, or in a very short time, to the ordinary system. For instance, when, in the mixed system of Fig. 42, we break off one of the films of the laminar cube, the system immediately resumes the arrangement of Fig. 28. This again is a curious transformation. For breaking these films it is best to use a point of filtering paper.

Fig. 42



In the third place, if, after having formed the ordinary system of the cube, (Fig. 28,) we break, by the means just indicated, the quadrangular lamina, the system immediately assumes a wholly different and equally regular arrangement; the new system presents a void in the middle, but it may still be considered as perfect in the sense that films proceed from all the solid edges. So when, in the system of the quadrangular pyramid (Fig. 22) we break the superior lamina, a new and beautiful system is obtained, which in like manner is perfect, though also presenting a void in the middle. Finally, an analogous result is brought

about, but with two vacancies, by breaking, in the system of the octahedron, (Fig. 26,) first the superior quadrilateral, next the film which then replaces the inferior quadrilateral.

§ 41. We will terminate this series by a remark relative to the persistence of laminar systems. All those of the polyhedral frames are less enduring than the figures formed of a single film, such as spherical bubbles or figures of revolution, (5th series, §§ 14 and 15.) The explanation of this fact rests on the considerations stated in §§ 32 and 33 of the 2d series, in reference to laminar systems realized with oil in the interior of the alcoholic liquid—considerations which I shall here reproduce in a more complete manner.

It will be remembered that a liquid film adhering to a metallic thread is necessarily joined to this, or rather to the liquid layer which moistens it, by a small mass with transverse curvatures strongly concave. The two surfaces of this small mass exert, therefore, a capillary pressure less than those which correspond to the two surfaces of the film, and consequently the excess of pressure of the latter must continually drive the liquid towards the former. Hence a new cause for the progressive attenuation of the film, and consequently of the destruction of the figure. This cause exists in every laminar figure adherent to a thread or to wires; but in the systems formed in the interior of polyhedral frames, there is added a cause of the same nature, and still more energetic. All these systems, in effect, contain liquid edges, which are united four by four in liquid points, and of which several are attached by their other extremity to solid threads; now, on these edges, as well as at their extreme points, there are also, we recollect, small surfaces strongly concave. Those which pertain to the edges are, like those which prevail along the wires, only concave in one direction, and consequently their action in rendering the films thinner is of the same order; but, at the points of junction of the liquid edges, and at the points where these edges terminate at the wires, the small surfaces are concave in every direction, so that their capillary suction is about twice more strong, and hence the afflux of liquid towards these same points must be much greater. In the systems in question, the films must therefore become thin much more rapidly, and these systems endure for a shorter time, as experience evinces they do. There is no gradual augmentation of thickness, however, either in the liquid edges or in their points of junction, but this is because the liquid, in proportion as it flows thither, is drawn by gravitation towards the base of the system. The persistence of each of these systems is, indeed, very variable, as may be readily conceived, for, in consequence of their complexity, slight accidental causes may act, sometimes more, sometimes less, to induce their destruction; whence, of all of them, that which in general is longest maintained is the most simple, namely, that of the tetrahedron.

I shall recur anew to the laminar systems in order to consider the theory under a more general point of view. In effect, as I have already shown, (§ 2 and note of § 8,) the liquid films which compose them may be assimilated to stretched membranes, and hence each system will be arranged in such a manner that the sum of the surfaces of all its films shall be a minimum. But I reserve this subject for another series.

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REPORT ON THE TRANSACTIONS
OF THE
SOCIETY OF PHYSICS AND NATURAL HISTORY OF GENEVA,
FROM JULY, 1865, TO JUNE, 1866.

BY DOCTOR GOSSE, PRESIDENT.

TRANSLATED FOR THE SMITHSONIAN INSTITUTION.

A rule of the society imposes on me the obligation of retracing the principal subjects which have occupied attention during the year just elapsed. In proceeding to acquit myself of this official duty, I should state in advance that the large number of the communications made to the society in its eighteen sessions, while it evinces the scientific interest and constantly increasing zeal which have animated our periodical reunions, leaves me no option but to restrict this notice to the communications in which our members have taken the initiative. The review, however, will at least have the advantage of being conscientiously exact, since it will be based on accurate minutes kept by our worthy secretary, M. Alexander Prevost. Without changing anything in the plan adopted in the preceding years, I have simply added the date of each communication, with a view of securing to the several authors the priority which belongs to them.

PHYSICAL SCIENCES.

Experimental and theoretical physics.—Professor Wartmann described (September 7, 1865) a *pneumatic mercurial pump*, for the construction of the tubes of Geissler, and of barometers and instruments requiring as perfect a vacuum as possible; reminding us, at the same time, that the first practical apparatus designed for the production of this vacuum was due to Mr. Welsh, who applied it in the atelier at Kew. In a recent number of his annals, M. Poggendorf has published a modification of Geissler's pump, which requires the use of an ordinary pump and of a great quantity of mercury. No detailed description of the instrument employed by the artist of Bonn having been given, M. Wartmann has constructed one, all the parts of which are stationary, and which requires but a moderate quantity of mercury. A siphon of wrought iron, with vertical branches, communicating by an inferior tube provided with a cock, serves to fill completely with mercury the receiver which it is proposed to exhaust of air. The mercury reaches this receiver by injection from below upwards, and the action of heat suffices to expel the vapor and air adhering to the walls. The tube, when full, is closed by an upper cock, emptied of mercury by the lower cock, and finally closed (after having received by means of a lateral tube any rarefied gas which it is to contain) by the fusion of its two tubular extremities with the blow-pipe.

A memoir was read by the same member (October 5, 1865) on *the maximum explosive distance between the sequent electrodes for the current induced by the opening of the circuit of Ruhmkorff's apparatus*. He has ascertained that the spark is longest when it passes between the positive exterior and the negative interior electrodes. There is here, therefore, an influence of the direction of the

discharge, which does not exist in the electric battery. The explanation of this singular fact is found in the difference of accumulation and tension of the electricity at the two extremities of the inductive wire, and in the elevation of temperature of which the negative pole is the seat.

M. Wartmann also communicated (November 16, 1865) some observations which he had made on *the appearance of the spark produced in a vacuum by currents of induction*. This spark is elongated; at the positive pole it sometimes presents a reddish effluence, and at the negative pole it becomes violet. By employing for the electrode a cylinder of soft iron, the reddish effluence was environed by a violet aureole. With reference to these researches, he announced (December 7, 1865,) that he had made use of a tube of glass, having two concentric chambers without communication with one another, and each enclosing traces of a gas different from the gas of the other. The positive electrode was in one of the chambers, the negative in the other. When, in this case, a powerful coil is employed, the course of the current may be reversed without changing the colored appearance at the two poles. M. Wartmann states that, contrary to what is affirmed by the manufacturers of the tubes of Geissler, he has found that in process of time the tubes, so far from improving, lose something of their efficacy. He remarked also that after new researches he has seen no influence exerted by magnetism on the stripes of the spectrum, which is a confirmation of the conclusions he had advanced several years before.

Professor Volpicelli, honorary member of the society, (present at the meeting of September 7, 1865,) took occasion to observe that, although we have numerous investigations respecting the quantity of atmospheric electricity, the nature of that electricity has been little studied. He thinks that he has observed a diurnal qualitative period in the atmospheric electricity, a quotidian passage from positive to negative. He is of opinion that for this kind of researches it is necessary to return to the method of Franklin.

Professor Marignac, in reference to the researches published in France on *aeronautics by wings*, maintains (October 5, 1865) that their authors have proceeded on entirely false data as regards the quantity of labor necessary in order that a machine for flying should sustain itself in the air. According to his calculations, in a machine of this sort, the ratio of the motive force to the weight raised varies as the square root of the section of the wings. The motive force should augment proportionally to the square of the weight raised, which is an unfavorable condition for the realization of such machines. From this it would result that, if all birds had the same form and structure, the largest would fly with least facility.

M. Cellerier presented (November 2, 1865) a memoir *on the measurement of gravity by means of the inversion pendulum of Bessel*. He showed that, for this kind of observations, it is requisite to attain a relative exactness of at least one hundred-thousandth. Setting aside the errors pertaining to the measures of time, there are others which are found to act on the inversion pendulum, so that the alteration which results therefrom in the duration of the oscillations, according to the two suspensions necessary to this apparatus, is constantly in the same ratio, and the alteration which results in the two cases, from the defect of the measurement of distance of the points of suspension, is also in the same ratio. By means of the two observations of duration, it is thus practicable to eliminate at once all these small alterations, and to obtain the duration reduced to a vacuum. This result is of great importance, because the accidental movements of the air have never been susceptible of being exactly appreciated. The apparatus of Bessel may thus lead to a rectification of the value assigned to gravitation.

General Dufour (December 21, 1865) gave details of the *direct levelling now in process of execution in Switzerland*. The plate fixed in the stone of the Niton at Geneva will serve as the point of reference; and of course there will be negative numbers, as Bâle is nearly 200 metres lower. Professor Planta-

mour communicated (December 21, 1865) certain results arrived at in the operations of this levelling, with the excellent instrument constructed at Aarau by Mr. Kern, and of which the level is particularly accurate. These operations, conducted in concert with the international geodetic commission, are connected with the arc of the meridian, the study of gravitation and that of the form of the terrestrial spheroid. In regions where the slopes are not very great, three or four kilometres are executed in a day, and the error scarcely transcends two or three millimetres to the kilometre. Thus far the levelling has been carried from Neuchâtel to Chaumont and the Chasseral; then by the valley of Ruz, the Chaux-de-Fonds and Locle to Morteau, from Nyon to Saint Cergues and the Rousses, and from Geneva to Morges and Neuchâtel. The polygon of levels which connects Neuchâtel with the Chaux-de-Fonds and Saint Imier has a development of about sixty-one kilometres, and was closed with an error of only fourteen millimetres. In proceeding to connect the stone of Niton with the *limnimètre* on the quay, it was found that the column must have sunk more than five centimetres in eighteen months. This is owing to the subsidence of the ancient bed of the lake on which the new quay is constructed. The same member communicated to the society (March 15, 1866) the continuation of his researches *on the determination of the value of gravitation by means of the pendulum of Repsold*. He has succeeded in further eliminating some causes of error in considerably prolonging the duration of each experiment. Instead of observing only series of 500 oscillations during six or seven minutes, he has continued his observations for some forty minutes, which have given him nearly 3,000 oscillations. These new observations have raised the value of gravitation at Geneva to 9 metres .80381, a result which may be considered as exact to nearly $\frac{1}{490000}$.

M. Perrot announced (January 4, 1866) that he had succeeded in causing to be constructed a furnace for melting substances such as gold and silver, heated by the ordinary lighting gas. M. Philippe Plantamour called the attention of the society (January 10, 1866) to a fact of interest in horology, observed by himself, namely, that in clocks with an anchor escapement, it is the pallet of steel which is worn by the wheel of brass, and that in watches, the pallet of ruby is worn by the teeth of the wheel made of steel.

Professor de la Rive gave an account (March 1, 1866) of researches made by Professor Dufour of Lausanne, in behalf of the commission of the Helvetic Society charged with *the study of terrestrial electric currents*. After explaining the difficulties met with in the observation of these currents, as well as the expedients adopted by M. Dufour to surmount them, M. de la Rive announced that there is an electric current almost constantly passing from Berne to Lausanne, that is to say, from north to south, though sometimes it exists in the inverse direction. M. Dufour has clearly shown that this is no thermo-electric current. The nearly constant existence of these currents, proceeding from the pole to the equator, connects itself with the continual production of the aurora borealis. When these phenomena augment in intensity and become visible in lower latitudes, the terrestrial currents also become more intense. The same member having afterwards (April 5, 1866) resumed an investigation of the phenomena which he had observed in plates of glass submitted to a simple discharge of Ruhmkorff's apparatus, was led to repeat the well known experiment of compressed laminæ of glass, which exhibit, as long as the compression subsists, certain optical properties. In one of these experiments, the compression having been too sudden, a splinter of glass was detached from the plate, which, although withdrawn from the compression, preserved the optical properties which had been communicated to it. At the same sitting M. de la Rive gave some details on the experiments which he had made in seeking to explain *the phenomenon of the vibratory movements determined, in the conducting body, by the combined action of magnetism and the discontinuous currents*. He has

succeeded in demonstrating that conducting bodies transmit electricity by molecular discharges, analogous to small voltaic arcs. The sound produced, when use is made of discontinuous currents and a powerful magnet, is not due to the vibration of the conducting body, but to the vibrations of the molecules of that body, which are under the influence of the magnet; hence, to reproduce the phenomenon, we may operate on metallic powders, or even on a column of mercury.

Dr. Dor (April 5, 1866) drew attention to the sinking of the waters of the lake which occurred at the close of the winter, and which appears to have followed the removal of the dam of the Rhone at Geneva. This subsidence, however, is now general. It was perceived first at Nyon, then successively at Rolle, at Ouchy and at Vevay. Colonel Gautier, (May 3,) in reply to the observation of M. Dor, said that he had compared the heights of the water marked on the limnimetres of Geneva and Vevey, during the months of February and March. He thinks, with General Dufour, that the effect of the dam on the level of the lake could be only very restricted.

Meteorology.—Professor Gautier read a note (September 7, 1865) *on the results of meteorological observations made, in 1864, at seventy-six Swiss stations*, under the relation of temperatures and quantities of water which have fallen. To this note is added a table of the thermometric mean, both annual and for the four seasons, as well as the annual quantities of rain and snow at those stations. A confirmation is hereby afforded of what Professor Plantamour had already observed, namely that at equal heights the temperature of the Swiss stations to the south of the great chain of the Alps is more elevated, by about three degrees Centigrade, than that of the stations to the north of the chain. On the north side of the chain, at very proximate points, there are considerable inequalities of temperature. In the annual quantities of the water which falls there are also great differences between stations quite near one another and situated at nearly the same height.

Dr. Lombard, applying *the rules of statistics to the influence of the seasons on the mortality*, communicated (December 7, 1865) one of the results of his inquiries, namely, that in the habitable temperate zone, cold augments the mortality, and more particularly that of infants in the two years which succeed birth. Thus there are more deaths in winter than summer. At Geneva, the month of February is, in this respect, the least, the month of September the most healthy. There is an exception, however, to the rule, wherever the intermittent fever (malaria) prevails, and the greatest mortality takes place during the hot weather. This exception is observed even in cold countries, such as Sweden and Iceland. Official documents from Australia, Chili, &c., evince the general rule to be the same in the austral hemisphere.

Professor Plantamour (January 10, 1866) referred to the anomaly which was observed at Saint Bernard in the month of December last. During several consecutive days the temperature there was two degrees higher than at Geneva, and he asks whether the beds of fog which then covered the valleys might not have contributed to warm the mountains by reflecting the solar rays.

Professor Favre communicated (February 1, 1866) details respecting the station at Saint Theodule, in Valais, where three guides have been installed since the 1st of August last, in order to make meteorological observations for a year. The present winter seems, so far, to have been there quite mild. There were days in December when the temperature was probably higher than at Geneva.

Chemistry.—M. Louis Soret communicated (November, 2 and 16, 1865) the results at which he has arrived in his researches *on the density of ozone*, a subject on which he had already published a memoir in the *Archives of the Bibliothèque Universelle* of 1863. On this occasion he announced two new series of experiments. In the first, he occupies himself with the diffusion of ozone, and proves that this diffusion and the action of the ozone correspond to those of a

gas more dense than oxygen. In the second, directing his inquiries to the existence of a body which really absorbs ozone, instead of separating it by absorbing but a part, as is the case with the iodide of potassium, he finds the essence of turpentine to be the most favorable substance for effecting this absorption. Ozonized oxygen, when treated with this essence, undergoes a very considerable diminution of volume, being very nearly double the volume of oxygen absorbed by the iodide of potassium. This would confirm the hypothesis that the molecule of ozone is composed of three atoms of oxygen, and that consequently the theoretical density of ozone is one and a half times that of oxygen. In the sequel he has found in the essence of cinnamon a substance not less favorable than the essence of turpentine for effecting the absorption of ozone, and comparing the diminution of the ozonized gas, treated with these essences, with the augmentation of volume which the same gas undergoes through the action of heat, he has arrived with more exactness at the conclusion that, in effect, the density of ozone is one and a half that of oxygen.

M. Delafontaine, (February 1, 1866,) after recalling the fact that his previous researches have confirmed those of Mosander, on ythria, terbine, and erbine, explained how it may have happened that MM. Bunsen and Boehr did not recognize these three earths. His last researches, while confirming his previous inquiries, and consequently also the results obtained by Mosander, have led him to see that MM. Bunsen and Boehr, who deny the existence of terbine, have, notwithstanding, had that substance in their hands, but that they have taken it for erbine.

Professor Marignac (February 15, 1866) called the attention of chemists to *the danger arising from the contact of the double salt of the fluoride of niobium and potassium with the skin*. This salt produces an alteration of the cutis, under the form of rubefactions and eruptions, accompanied with itching, which may last without diminution for six months after the accident.

Professor Wartmann (May 15, 1866) also drew the attention of the society to *the dangers of explosion presented by the oxalate of silver*. MM. Marignac and Perrot suggested that the explosions observed by M. Wartmann might be owing to the presence of organic substances mixed with the oxalate.

NATURAL SCIENCES.

Geology.—Professor Favre, member of the federal geological commission, presented (January 10, 1866) a geological chart of the environs of Brugg, executed by M. Mœsch, and which forms a part of those published by the commission.

M. de Loriol read a memoir (March 15, 1866) *on the upper Jurassic deposits, and particularly those of the environs of Boulogne sur Mer*. Both in England and France the marls composed of the *Ostrea virgula* are usually surmounted by masses of limestone, more or less compact, sometimes coralline, which are covered in turn by deposits of Purbeck. These formations represent the Portlandian, properly so called, and, in England, comprise a very special fauna, of which the *Trigonia gibbosa* is one of the characteristic fossils. At Boulogne are found strata analogous to those of the Purbeck beds, beneath which beds of limestone, sand, sometimes clay, form the equivalent of the English Portlandian, and include several of its characteristic fossils, among others the *Trigonia gibbosa*. In proportion as we descend into the series of deposits, the species of the English portlandian are found to diminish in number, and those of the kimmeridian to increase. Immediately above the *Ostrea virgula* marls occurs a bed of limestone bearing the *Ammonites gigas*, (Zieten,) which terminates the series of strata that may be considered as the equivalent of the English Portlandian, or rather as the upper portion of the kimmeridian group, of which the Portland beds would constitute but a local *facies*. The inferior layers of this mass have been traversed by the railroad from Boulogne to Calais, in which excavations have brought

to light numerous fossils in a state of remarkable preservation, among others the *Neritoma sinuosa*, (Morris,) which is very abundant. (See *Memoir de la Société de Phys. et d'Histoire Nat.*, tome xix, first part.)

M. Chaix communicated (April 5, 1866) his observations on the volcanic rock of the left bank of the Rhine, near Andernach. This rock, which he has traversed and studied, extends over a surface of $7\frac{1}{2}$ leagues from north to south, by $3\frac{3}{4}$ leagues from east to west. Thirty cones, rounded at the summit, are the craters of as many extinct volcanoes, rising to a mean level of 700 feet above the surrounding inhabited places, which last are 500 feet above the sea. The plains are formed of deep beds of cinders, lapilli and volcanic tufas. At more than 100 feet below these deposits a thick bed of basaltic lava is worked, near Niedermending, for mill-stones. In the centre of the volcanic region the lake of Laach, circular in its form, has a surface of 338 hectares, a depth of 177 feet, and a level of 847 feet above the sea, since the construction of a subterranean drain has reduced it by 18 feet. Besides this lake, thirty ancient craters may be counted, which have been converted into lacustrine basins, more or less dried, and especially numerous in a second volcanic region lying more to the west than the first, and to the north of Trèves.

Botany.—M. Marc Micheli communicated (July 6, 1865) observations on the stamens in the family of the *Ericaceæ*. In some species of this family the stamens are provided with appendages of very variable forms; these are sometimes long awns, sometimes membranaceous awns, sometimes simply small strumæ. He has found that, when observed with the microscope, whatever their outward appearance, their internal structure is always the same. Under a layer of epidermis is seen a certain quantity of spiral cells. The tissue which these form is prolonged to a certain distance along the walls of the loculaments of the anther. The distribution of the appendages in the species and tribes of the family follows no rule. Two neighboring kinds or species may differ in this respect.

M. Duby, (October 15, 1865,) with reference to a champignon of the vine, on which he read a notice thirty-one years ago, said that he had never met with it since then, but that this year it is very abundant. MM. de Candolle and Muller are inclined to ascribe the development of its spores to the drought which has prevailed. M. Duby, in giving an account of the new researches of MM. Bary and Allié on the Mucedineæ, recalled the fact that when the spores of the *Mucor mucedo* are sown on different substances, completely different forms are seen to be developed in the resulting mouldiness, which have been classed heretofore as different species. It is probable, therefore, that more than twenty species of Mucedineæ should be suppressed. These same spores, sown in water, may even produce algæ. In support of these observations, Professor de Candolle added that his father had already remarked, at Annonay, that the champignons which were developed on old rags or waste scraps varied according to the origin of those articles. At Paris, the dealers in cheese had assured him that the mouldiness varied according to the part of France from which the cheese was brought.

Dr. Muller (November 2, 1865) entered into some details on the inflorescence of the genus *Dalecampia*. This inflorescence is composed of a general involucre formed by three pairs of decussated bractææ. The involucre encloses flowers of two sexes. After having described with care the position of the female and male flowers, M. Muller compares this inflorescence with that of the genus *Euphorbia*, the involucre of which is quincuncial, and shows by diagrams that in the *Euphorbias* the relative position of the two sexes presents the contrary of what exists in the *Dalecampias*, the summit in the former being occupied by a female flower and not by male flowers. In comparing the male flower of the *Dalecampia*, which is polyandrous, and provided with a calyx and an articulated pedicle, with the male flowers of the *Euphorbias*, which are monandrous and

destitute of a calyx, and taking account of the arrangement of the flower in the species *Dactylostemon* and *Actinostemon*, M. Muller arrives at the conception that the part situated above the articulation of the male flowers of the *Euphorbias* should be regarded as an axis—that is to say, as a part of the articulated pedicle destitute of a calyx, or rather a prolongation of the receptacle bearing on its summit a sessile anther. There would then be nothing herein very paradoxical, and we should only have a monandrous flower, the filament of which would be as large as and sometimes larger than the pedicle. The same member announced (December 21, 1865) that in the genus *Macaranga* of the family of the *Euphorbiaceæ* he has met with individuals, which presented on the same flower stamens with three and with four loculaments. This would suppress the genus *Pachystemon*, which would no longer be distinguished by any character from the genus *Macaranga*.

In the last place, M. Muller (May 3, 1866) spoke of *the secondary characters of the aestivation of the calyx*, which enable us, even long after the expansion of the flower, to recognize in what manner the lobes of the calyx or the sepals must have been disposed at the time of the budding. In the valvate aestivation, these lobes or sepals are all equidistant from the arch of the flower, and, before the expansion of the calyx, each lobe from the base to the summit touches its neighbor by the unattenuated edge of its borders. In the imbricated aestivation, on the contrary, the lobes are not equidistant from the centre, one of the two neighboring lobes being always more exterior than the other, and one of the borders covering the other. In the first case, the lobes are necessarily acuminate in order to their meeting at the summit of the calyx, and (if the calyx be straight) they have necessarily the same length, and the borders, touching one another face to face in the same plane, cannot but be entire. Hence M. Muller considers it established that, in flowers which have already opened, each of the five following characters indicates an imbricated aestivation in the bud :

1. Sepals, or lobes of the calyx, being alternately of an equal length.
2. Sepals, or lobes of the calyx, being rounded at the summit.
3. Sepals, or lobes of the calyx, being attenuate, membranous or scabrous on their borders.
4. Sepals, or lobes of the calyx, being variously dentated, lobated, laciniated, or otherwise divided.
5. Sepals, or lobes of the calyx, having marginal (particular) bristles, situated in the same plane with the lobes.

M. Casimir de Candolle communicated to the society (January 4, 1866) a memoir on the *family of the Piperaceæ*, which is to form part of the *Prodromus*. The author divides the family into two groups, the *Piperomiæ* and the *Piperiæ*, according to the organization of the stalk. In treating of the evolution of the leaves, and of their structure, he establishes that the so-termed stipules opposed to the leaves are prophylla; that the mode of evolution of the buds and the arrangement of the leaves explain the irregularity of the limbs. As to the nervation, it is in this family penninervate or digitinervate; but these two systems enter into the same type in the same manner as the intermediate nervations called multiplinervate. If, in effect, sections be made in the leaf at different distances from the petiole, the lateral nervures are seen to proceed from the median nervure, and all the nervures are formed of the prolongation of the external layers of the peripheral fasciculi of the boughs. On comparing the distribution of the fasciculi in the bough and the leaf, certain analogies are perceived between these two organs, which are commonly considered as very different. The leaf offers analogues of the bark, of the ligneous system, and the medulla; it often represents a flattened bough. The author concludes with a table of the classification, in which he materially reduces the number of species admitted by some botanists.

M. Edmond Boissier exhibited (February 1, 1866) specimens of three kinds

of plants recently discovered, which are worthy of remark from having been found in regions very remote from those inhabited by all the other species of each family to which they pertain. In the first place, a *Dioscorea pyrenaica*, a European and Alpine species found in the Pyrenees; then a *Pelargonium*, discovered in the chain of Taurus, while almost all the species come from the Cape, except a few species brought from New Holland; lastly, M. Boissier has recently found a *Pilostyle*, or a plant of the prickly *Astragalus*, which was sent to him from the East by M. Hausknecht, botanist.

Professor de Candolle stated (March 1, 1866) that, in studying the genus *Begonia*, he had recognized therein fifty-seven very natural sub-genera. As a general principle, it will be found that in proportion as the groups of a genus are better established and characterized those groups will be geographically circumscribed. The African species of the *Begonia* are generally very different from those of other equatorial regions, and particularly from those of Brazil. M. de Candolle therefore deems it probable that the deep cavity which separates America from Africa has existed from very remote geological epochs.

Zoology.—Dr. Claparede communicated (July 6, 1865) the result of observations which he had recently made on the *Rotifers*, with a view to explaining the mechanism of their alimentation. He shows that the cilia of the rotary organ do not directly contribute to the afflux of liquids towards the mouth; they merely generate closed currents, which move in something of an ellipsis perpendicular to the plane of the vibratory organ and tangential to the ciliated border of that organ. These currents pass along a groove under the edge of the rotary organ and parallel to that edge. A part of the molecules, carried along by these closed currents, penetrate into the groove, and are thence conducted into the mouth by a row of secondary cilia. This second row of cilia presents, in effect, a contrary movement in the two rotary organs of the *Rotifers*, and in the two lobes of the single organ in the *Meliceræ*. Among all those of the animals in question in which the rotary organ is double, as in the *Rotifers*, the apparent movement is identical in the two organs; that is, the inverse of that of the hands of a watch. The mouth being situated between the two organs, it is impossible that both should convey the nutritive particles to the mouth, and yet direct observation shows that the aliments are precipitated from right and left into the buccal orifice. The same contradiction presents itself in the *Rotifers* with a single organ, but bilobate, with the mouth under the groove; as, for example, in the *Meliceræ*. The movement, in fact, passes from the right to the left lobe, preserving the same direction. It is consequently directed towards the mouth in the first, and away from the mouth in the second; nevertheless, the nutritive particles flow from the two sides into the mouth.

The same member, (January 4, 1866,) after having noticed the latest researches of Meczniokoff and Leuckart on the transformations of the *Nematoidæ*, gave a history of the different states of the *Ascaris nigrovenosa*. He entered also into details on the development of the '*Cucullant*' of the pike and the perch, and on that of the '*Olulant*' of the cat.

M. Lunel read a memoir on the genus *Brama*, (see Mem. de la Société de Phys. et d'Hist. Nat., t. xviii, p. 165,) a genus of fishes heretofore imperfectly studied, and on a new species brought from the island of Cuba by H. de Saussure, to which the author has given the name of *Brama Saussurei*. In this interesting treatise, accompanied with plates and new anatomical details, the author especially sets forth the very remarkable differences presented by the scales in this group of fishes—differences which furnish excellent specific characters.

M. Victor Fatio, (October 5, 1865,) in speaking of experiments which he had made to verify the kind of utility incident to the cavities of air in the bones of birds, stated that these cavities, though perforated, had not perceptibly affected the faculty of flying.

The same member read a memoir (February 1, 1866) *on the changes of coloration in the feathers of birds*. After having studied the structure and development of feathers, the author analyzes the causes which may produce a change of coloration in the same feather, without a moulting having taken place. He seeks to explain the variety of colors and reflections by the play of the light falling on parts differently developed. He finds in autumn, in every feather, an apparent color and a latent color, and attributes the brilliant coloration of spring to the internal solution of pigmentary granules existing in the interior of the tissues. The humidity of the ambient air tends to swell the cortical substance of the feathers, at the same time that the fat of the body dissolves the latent pigment, which is diffused and colors the feather from the periphery to the centre. The extremities dry up and permit the portions which become gradually colored to appear. M. Fatio distinguishes three kinds of feathers—the ordinary, which contain a pigment of the color they affect when seen either by transparence or by incident light; the optical feathers, which present reflections and contain a brown pigment; lastly, the enamelled feathers, which, always blue, contain a blackish pigment. Now, in the ordinary and the enamelled feathers it is the barbs which are developed, while in the optical feathers it is the barbules which become swollen. The author attributes the luminous effects to a phenomenon of interference; he compares to colored rings the lines alternately brilliant and obscure, exhibited in incident light by the segments and separating partitions of the optical barbules; and he explains the blue color of the enamelled barbs by the passage, across a colored transparent layer, of rays reflected below by a dark layer tinted in a different manner. He remarks that it would be improper to confound the phenomena of which he has given this account either with those of the discoloration which is observed in some of the palmipeds—a discoloration accompanied by a discharge of the pigment, or with the external coloration produced by rubbing in certain birds, or with the discoloration which takes place in collections by the saponification of the fats. Finally, rejecting all idea of a renewal of life in the feather at the time of its second coloration, the author finds in his observations the explanation as well of albinism as more especially of local varieties. (See *Mem. de la Société de Phys. et d'Hist. Nat.*, 2d partie, t. xviii, p. 249.)

M. H. de Saussure presented to the society a work, which he has published in collaboration with M. Sichel, entitled *Catalogus Specierum Generis Scolia*. He took occasion to observe that among the Scolias the females sometimes vary much from one another, while the males change but little; so that, in some kinds, it might be said that the females were of different species, while the males are all of one species. This may be explained by the fact that the males exist for little else but the accomplishment of the act of generation, while the females, coming into contact with the various incidents which beset them in the accomplishment of their proper functions, undergo modifying effects from this circumstance. M. Humbert made the remark that there are certain groups of crustaceans in which, on the contrary, it is the males which vary, the females remaining the same, a fact which pertains probably to the different part which the males play in the struggle for existence. Dr. Muller adverted to a circumstance of the same nature in regard to the male and female organs of flowers. M. Edouard Pictet, our new colleague, presented to the society (January 4, 1866) his *Synopsis of the Neuroptera of Spain*.

Personnel.—We have the pain of recording the loss of three of our colleagues—that of M. Perrot, member *emeritus*; of M. Frederick Soret, member in ordinary; and of Dr. Montague, honorary member.

Louis Perrot was born June 30, 1785, of a French family which had settled at Neuchâtel at the epoch of the Reformation. His taste for natural history was early developed by reading the *Spectacle de la Nature* of the Abbé Pluche, a book which, fifty years before, had produced so vivid an impression on the celebrated Bonnet.

So well did Perrot employ his time that, at the age of eighteen, when he came to Geneva, he was welcomed and encouraged by most of the distinguished savants who were there, and especially by the blind philosopher, the venerable Huber. He had the advantage in 1807 of accompanying de Candolle in a botanical exploration of the south of France and of the Pyrenees, and afterwards resided for some months in Paris, where the kind offices of his illustrious fellow-traveller placed him in amicable relations with the savants of that capital. Returning to Neuchâtel at a later period, he became engaged in new pursuits; elected in 1816 a deputy of the grand council of the city, (called the forty,) he formed a part of several committees of public utility, and was named president of that of education. Thus brought into closer communication with men of that specialty, both at home and abroad, such as Pestalozzi and Father Girard, he took upon himself the direction of one of the schools of Neuchâtel, in order to acquaint himself practically with the advantages of the system of mutual instruction, and to qualify teachers for the pursuit of that method. Botany was not the only branch of the natural sciences which he cultivated; his researches on the fishes of the lakes of Neuchâtel and Geneva, as well as of the Mediterranean in the vicinity of Nice, were of great interest; nor less so, those on the habits of a great number of insects, particularly bees, different kinds of wasps, and hornets. Yet he published nothing, contenting himself, when he had finished a memoir, with communicating it to his learned friends, to whom also he has bequeathed his herbals and other preparations. Yet, however modest and severe in regard to his own discoveries, it is probable that many of the observations of Perrot would have been entirely new had he published them at the time when they were made. We will cite but one, which, if confirmed, cannot fail to be of real interest. This relates to the *Dytiscus*, (Dytiscus,) its larva, and its nymph. After describing the curious position which the latter adopts in the cavity which it digs in the clay, he describes the very singular effects produced when this nymph is held in the hand, and which consisted of all the physiological symptoms attending discharges of galvanism. After taking the proper precautions and repeating the experiment on persons not forewarned, he satisfied himself that, in this case, an electrical phenomenon really takes place. In 1830 he returned to reside permanently at Geneva, devoting the last years of his life to acts of charity and religion. And, assuredly, he was not now in his apprenticeship; for as early as 1817 he had actively engaged in the organization of the succor extended to the poor, when a dearth was prevailing at Neuchâtel and in some parts of Savoy, and, for several weeks, made experiments upon himself to ascertain the quantity of nourishment strictly necessary for the maintenance of health and the physical forces. He was twice married; first, to a descendant of the celebrated mechanic Droz; and, secondly, to M^{lle} Rosalie de Pourtalès, by whom he had four children, the youngest of whom, our colleague, M. Adolphe Perrot, much to the satisfaction of his father, has devoted himself to the cultivation of physics. M. Perrot, having reached the advanced age of nearly eighty-four years, died somewhat suddenly June 9, 1866.

Frederick Jacob Soret, was born May 13, 1795, at Saint Petersburg. His father, a distinguished painter in enamel, had established himself in that city, where he enjoyed a high degree of the imperial favor, but was induced, from considerations of health, to return in 1800 to his native home, Geneva. His eldest son, our late colleague, early evinced a love of study and a quick intelligence; and, though destined for the church, gave himself with zeal to the natural sciences, particularly mineralogy and geology. In 1816 he read to the society of naturalists a memoir on the molasse of the environs of Geneva, in which, in contradiction to the views of Saussure, who held these formations to be marine, he was the first to announce the existence of fresh water fossils. At the termination of his theological studies, he composed a thesis, whose subject marked his taste for natural history, and was sustained by an exegesis not less enlightened than rational. He maintained therein that the six days of creation

were not periods of twenty-four hours, but eras of great length. These views, which were then new, though now generally admitted, incurred violent opposition and much reproach on the part of some of the examiners. This circumstance and his repugnance for the heated religious controversies of that epoch, led him to renounce the sacred ministry and devote himself wholly to scientific studies. In the autumn of 1819, he repaired to Paris and was received with warm interest by Brongniart, Bournon, Haüy, and Biot. At this epoch he produced a work of great merit on "the relations of the form of crystals to their optical properties," and on his return to Geneva published new memoirs on mineralogy and optics in the *Bibliothèque Universelle*, the *Mem. de la Soc. de Phys. et d'Hist. Naturelle*, and the *Bulletin de la Société Philomathique*. About 1822, his scientific career was somewhat interrupted by his being chosen to direct the education of the hereditary grand duke of Saxe-Weimar. It was at Weimar that he enjoyed the advantage of meeting the illustrious Goethe, between whom and himself relations of intimacy were soon established. Goethe was not merely a great poet; the natural sciences, and especially botany, were among his favorite studies. He had thus learned to place a just value on the savants whom our city so highly prized, and when I visited him in 1819 was never weary of extolling the labors of de Candolle and Vaucher. The arrival of the young and zealous naturalist of Geneva could not fail to confirm him in these favorable sentiments, and as he had just published a memoir on the *Metamorphosis of plants*, it was Soret who was charged with making a French translation of it. It will readily be conceived that, in an artistic and literary centre so brilliant as the court of Weimar, the decided taste of our compatriot for poetry and the fine arts received great development. The journals of the time and place contain, accordingly, a multitude of his productions in prose and verse, which attest his success as a writer and poet. Several excursions which he made into Russia and Italy with the prince, his pupil, confirmed these tendencies, and also led him to the study of archeology and numismatics, which he prosecuted with characteristic ardor to the end of his life. Hence we have more than thirty dissertations of his, not only on the coins of Geneva and its environs, but more especially on those of the east, Byzantine, Caliphat, Sassanide, Cufic, &c., published in the *Memoires de la Société d'Histoire et d'Archéologie de Genève*, the *Revue Numismatique Belge et Française*, the *Revue Archéologique*, and the *Memoires de la Société Impériale d'Archéologie de Saint Petersburg*. In this branch of learning he soon acquired a high reputation, and the study of Arabic, which extended even to the publication of a dictionary of that language, contributed to the accuracy of his judgment on the origin and value of oriental coins, the classing and legends of which had been previously so obscure. More than twenty learned societies of foreign countries felt a just pride in numbering him among their associates; but however numerous and flattering these distinctions, they made no impression on the modest and unassuming nature of Soret. (It would be beside the scope of this publication to give a detailed account of the various public offices in which he devoted his talents, experience, and admirable judgment to the service of his country.) In 1836 he had married M^{lle} Elisa Bertheau, and an only daughter, the worthy offspring of this union, contributed a charm and solace to their mutual existence. The health of our regretted colleague had been good to quite an advanced age, and had permitted him to enjoy in his retreat a life exempt from disquietude and devoted to study; but his last years were overclouded at times by obstinate rheumatic neuralgia, without prejudice, however, to the serene equality of his character, or the vivacity of his intelligence and tastes. Shortly after a visit from his old pupil, the grand-duke of Weimar, an accidental exposure to cold brought on pneumonia, to which malady he succumbed December 8, 1865.

Jean François Montague was born February 15, 1784, at Vaudoy, department of the Seine-et-Marne. At the age of fourteen he took part in the expedition to Egypt as assistant helmsman, and his precocious intelligence as well

as his amiability of character soon procured him protectors and friends among the French savants who composed the Institute of Egypt. This circumstance decided his tastes and vocation. At his return to France he applied himself with zeal to medical studies, and in 1809 was nominated chief physician to the Neapolitan army, under the government of Murat. Thenceforth he joined to his public functions the study of the natural sciences, and particularly of botany. Cryptogamy, and especially the cellular plants, till then much neglected, offered to him a vast field of exploration. Frequent voyages and a widely extended correspondence enabled him to publish in the *Annales de Botanique* and the *Annales des Sciences Naturelles* a great number of memoirs and articles on the cellular cryptogams, the lichens, the champignons, the algæ, &c., of Europe, America, and Oceanica. He made also a remarkable application of his researches to the maladies of the silk-worm, the vine and the potato. In 1842 he was nominated an honorary member of our society, and in 1852 was elected a member of the Academy of Sciences at Paris, in place of Professor Achille Richard. An indefatigable and conscientious laborer, Dr. Montague was one of those rare personages who have preserved to extreme age all their mental vigor, and who have honored humanity alike by the qualities of the intellect and the heart. He died at Paris, January 5, 1866.

Elections.—The precarious health of Professor Macaire, not permitting him to attend our sessions regularly, had led him to decline the place of member in ordinary, but his colleagues, not wishing to be deprived of the benefits of his learning and experience, and remembering his distinguished services to the society, have prevailed on him to preserve the title of member *emeritus*. M. Edouard Pictet has been elected member in ordinary, and MM. Bourcart, Laharpe, and Audeoud, as associates at large, so that the number of our *emeriti* is now two, that of members in ordinary forty, that of honorary members sixty-four, and that of associates at large thirty-nine. In the session of January, Professor Favre was proclaimed vice-president, and subsequently president for the ensuing year; M. Philippe Plantamour was named treasurer for a year, replacing M. Favre; Professor Marignac has been re-elected for three years as secretary charged with the correspondence; lastly, MM. Wartmann and Humbert have been appointed members of the committee of publication.

Permit me, in concluding, to recall the kind and delicate sentiments which I cannot but presume to have dictated my nomination to the presidency. Assuredly, I cannot attribute the honor conferred on me to any personal merit of mine, either as physicist or naturalist; neither could my medical specialty have been an adequate title; it is to be placed chiefly to the account of your good will in my behalf; but it must be regarded, also, as an acknowledgment which you desired to render to the memory of my venerable father, who, after having been one of the founders of the Society of Physics and Natural History, was one of the principal promoters of the Helvetic Society of the Natural Sciences, encouraged as he was by the support of his honorable colleagues of Geneva. It was, in effect, by the aid of the members of our society and of the honored pastor, Wyttenbach, of Berne, that he succeeded in constituting, in 1815, the nomadic and fraternal association of the Swiss naturalists, which has subsequently served as a model for those international scientific congresses which have drawn more closely the bonds of union among the savants of Europe. The year 1865 was the fiftieth anniversary of the foundation, and by your presence at Mornex, in the cradle of the Society, you have given a new sanction to that commemorative festival.

It only remains for me to thank you, my cherished and highly esteemed colleagues, for the zealous co-operation which you have never ceased to accord to me as president, a co-operation which has rendered my task as easy as it was agreeable, and to express my ardent hope that our society may continue to be distinguished by its scientific zeal and the inappreciable harmony which has always prevailed among its members.

NOTES ON THE TINNEH OR CHEPEWYAN INDIANS OF BRITISH AND RUSSIAN AMERICA.

1. The *Eastern Tinnéh*, from a MS., by BERNARD R. ROSS, Esq., honorable Hudson's Bay Company.

2. The *Loucheux Indians*, by WILLIAM L. HARDISTY, Esq., honorable Hudson's Bay Company.

3. The *Kutchin tribes*, by STRACHAN JONES, Esq., honorable Hudson's Bay Company.

COMMUNICATED BY GEORGE GIBBS.

THE above tribes are embraced in the *Athabaskan* group in Mr. Gallatin's classification of the Indian tribes, (Trans. Am. Eth. Soc., vol. ii,) but that name, according to Mr. Ross, is a foreign word, applicable only to a particular locality. The name of *Chepewyan*, given to the eastern tribes by most of the early writers, is merely a compound Cree word relating to dress. Sir John Richardson (Boat Voyage through Rupert's Land) adopts, and upon a more correct and philosophical principle, the name *Tin-neh*, which Mr. Ross says, though given in the vocabularies for "man," means rather "the people." It seems to be the appellation which each tribe applies to itself, other branches being distinguished by a prefix relating to locality, or some peculiarity of dress or appearance. Thus, while the Chepewyans call themselves *Tin-neh*, they call the "Slaves" *Tess-cho-tin-neh*, or the people of the Great river, (Mackenzie's.)

This family, the most northern in America excepting the Eskimo, is, at the same time, the most widely distributed, its range extending from the shores of Hudson's bay to the Pacific, where it is represented on Cook's inlet by the Kenai and other allied tribes. Several tribes, known collectively as the Tahkali, Tácully, or Carriers, inhabit the upper waters of Fraser river, extending south to Fort Alexandria, in about latitude 52° 30'. Near the mouth of the Columbia two small bands, now nearly extinct, inhabited the wooded country on either side of the river, and others are located on the Umpqua, Rogue river, and the coast of southern Oregon, and on the Trinity or south fork of the Klamath, in northern California. Finally, the same race, as shown by affinity of language, appears in Arizona, New Mexico, and Chihuahua, under the names of Navajoes and Apaches. The papers mentioned at the head of this article, and which follow, all refer to the northern branches, but do not include those of the Pacific coast.

Mr. Ross divides the northern portion of this great family into—

I. The eastern or Tinnéh tribes proper.

II. The mountain tribes.

III. The western, consisting, so far as British America is concerned, of the Tahkalis.

IV. The northern, including all the Kutchin or Loucheux tribes.

It is to the first of these that the portion of his own notes here given refers. Mr. Hardisty's and Mr. Jones's relate to the last.

1.—THE EASTERN TINNEH.—*Ross.*

PHYSICAL CHARACTER.

The eastern Tinnéh are of middle stature, squarely and strongly built. Although tall men are not uncommon in some of the tribes, the extremes in either direction are far from numerous. The lowest adult whom I have seen was four feet four inches in height, and the tallest, six feet six inches, the former a Slave, and the latter a Yellow Knife. As a whole they are tolerably fleshy, and their weight may be averaged at 140 pounds. The crania of these people are very large, with a tolerably good facial angle, the forehead rather high, and the skull elongated towards the occiput in most cases. The females appear to have the largest heads, and those of both sexes are covered with a matted profusion of black, coarse, and straight hair. They are, generally, long-bodied, with short, stout limbs, but without any disproportion between the lengths of the upper and lower ones. The extremities are small and well-formed, the hands thick, with short, tapering fingers, offering a strong contrast to the narrow, long, and bony hands of the Crees, and resembling a good deal in this particular the Eskimo of the Arctic circle. The most distinguishing feature in the race is the breadth of their faces between the cheek bones; this, with a high and rather narrow forehead and elongated chin, gives them a pear-like appearance. They are possessed of considerable bodily strength, of which, as the Hudson's Bay Company employ them as boatmen, there are excellent opportunities of judging. They can carry 200 pounds, in a strap passed over the forehead, without difficulty, but they are, as a whole, considerably under the average of the European servants in endurance and strength.

There is no particular cast of features other than the large and high cheek bones. Large mouths are universal; the teeth are white and regular, even to old age; the chins are commonly pointed, but cleft ones are not unusual among the Yellow Knives; the usual description of noses are the snub and bottle, with a slight sprinkling of aquiline; the ears, generally large, are placed well up towards the crown of the head; sparse mustaches and beard are sometimes seen, but whiskers are unknown; the eyes are mostly of a very dark brown hazel, varied with lighter, but never clear tints of the same color, and with black; they are often placed obliquely in the head, and although there is no general rule in the case, I think this form is oftener met with among the northern than among the more southern tribes. The prevailing complexion may, with propriety, be said to be of a dirty yellowish ochre tinge, ranging from a smoky brown to a tint as fair as that of many half-caste Europeans. The color of the skin is, in all cases, opaque, and its texture close and smooth. In a few instances I have seen the blood through the cheeks, giving a vermilion color to that part of the face. Cases of corpulency, though the rule in childhood, are very rare in old age. The women, if anything, are uglier than the men; of smaller stature, and in old age become positively hideous. The *mammæ* become pendulous and large, though they never, to my knowledge, attain the almost fabulous dimensions that I have heard are not uncommon among the Carrier women.

Nature certainly does more than art for the rearing of the children of these people. "God tempers the wind to the shorn lamb," and causes them to thrive under numerous disadvantages. Immediately after birth, without washing, the infant is laid naked on a layer of moss in a bag made of leather, and lined with hare skins. If it be summer, the latter are dispensed with. This bag is then securely laced, restraining the limbs in natural positions, and leaving the child freedom to move the head only. In this phase of its existence, it resembles strongly an Egyptian mummy. Cradles are never used; but this machine, called a "moss bag," is an excellent adjunct to the rearing of children up to a certain age, and has become almost, if not universally, adopted in the families of the

Hudson's Bay Company's employés. The natives retain the use of the bag to a late period, say until the child passes a year, during which time it is never taken out except to change the moss. To this practice, continued to such an age, I attribute the turned in toes and rather crooked legs of many of these Indians. A child is not weaned until another takes its place, if the mother has milk to give it, and it is no unusual thing for an Indian woman of these tribes to suckle a child three or four years old, even with a baby at her other breast at the time. Respecting the food of infants, the routine is as follows: If the mother has milk they suck so long as she yields it; otherwise, mashed fish, chewed dried meat, or any other nutritious substance that can be had from a not very extended variety is given. A curious and superstitious custom obtains among the Slave, Hare, and Dogrib tribes, of not cutting the nails of female infants till they are four years of age. Their reason for this is, that if they did so earlier the child would, when arrived at womanhood, turn out lazy, and be unable to embroider well in porcupine quill-work, an art which these Indians are very skilful in, and are justly proud of. Another extraordinary practice is their giving no nutriment to infants for the first four days after birth, in order, as they say, to render them capable of enduring starvation in after life, an accomplishment which they are very likely to stand often in need of.

It is difficult to determine exactly the age of puberty. In boys it commences about twelve. Indeed, they endeavor, as soon as they can, to pay their addresses to the sex, and marry, generally, at from sixteen to twenty years of age. To fix the period for girls is still more difficult. They marry sometimes, but not often, at ten, and have their menses about thirteen. The women are capable of bearing children from fourteen to forty-five, a long portion of their lives, but in it very few infants are produced. Families on an average contain three children, including deaths, and ten is the greatest number I have seen. In that instance the natives found it so unusual that they called the father "Hon-nen-na-bé-ta," or the Father of Ten. Twins I have heard of but once. The proportion of births is rather in favor of females, a natural necessity, as it is the women among these tribes who have the shortest lease of life, and there is from various causes a much greater mortality among the girls than among the boys. The period of utero-gestation is rather shorter than in Europeans, and seldom exceeds the nine months. Premature deliveries are very rare, and the women experience but little pain in child-birth, a few hours repose, after the occurrence, being sufficient to restore nature.

The duration of life is, on an average, short. Many children die at an early age, and there are few instances of the great longevity that occurs not unfrequently in more temperate climates. Rarely does one of the Tinneh reach the "three score years and ten" allotted to man, though an instance or two of passing this age has occurred within my own knowledge. A Slave woman died at Fort Simpson, in the autumn of 1861, who had already borne three children when Sir Alexander McKenzie, in 1789, descended the river bearing his name. Supposing that she had married at sixteen, and was confined once every three years, a high average for this people, she would have been ninety-seven years of age at the time of her death. For some years prior to her demise she was perfectly bed-ridden, and sadly neglected by her relatives, who evidently fancied that she had troubled them long enough. She lay solitary and forsaken in a miserable camp, composed of a rude shelter and bed of pine brush, her only covering a tattered caribou-skin robe. Such was the malignity of her disposition, even in "articulo mortis," that she reviled at nearly every adult, and struck with a stick at all the children and dogs that passed by her den.

The Tinneh are far from a healthy race. The causes of death proceed rather from weakness of constitution and hereditary taint than from epidemic diseases, though, when the latter do come, they make great havoc. Want of proper and regular nutriment and exposure in childhood in all probability undermine their

constitutions before they come of age. The most prevalent maladies are influenzas, coughs, bilious affections, dysentery, and indigestion, brought on by gluttony. Scrofulous cases are not uncommon, and all the tribes are more or less subject to a pseudo-syphilis of great virulence, and which is, so far as I can learn, indigenous. Ophthalmic affections are very common, chiefly among the Athabaskan and English River Chepewyans. They probably have their origin in syphilis. There are a few instances of total blindness, produced by the snow glare on the great lakes in spring. Lice literally overrun all the natives. Fleas are unknown. The former insects are eaten as a species of relish, and are cracked in the teeth and nibbled, in order the better to enjoy the flavor, which the Indians represent as sweet. The tapeworm (*tænia*) is rather common. Like all hunter tribes these people have the senses of sight and hearing in perfection, while, owing to the dirtiness of their habits, that of smell is greatly blunted.

RELIGIOUS OPINIONS.

It is a task of no ordinary difficulty to arrive at correct conclusions respecting the mental characteristics and religious ideas of the eastern Tinnéh. They are exceedingly averse to laying open their belief, such as it is, to strangers, and their real disposition is exhibited only in the camp, amidst the freedom of social intercourse. Deprived as I am of reference to the works of McKenzie and Hearne, I must, unaided by any gleams thrown on the subject from the past, describe things as they exist, under the light of the present.

These people seem to possess as cold and simple a theology as any known race of mankind. I am not, however, certain that such was the case seventy years ago. Many causes, all of which must have had more or less power, have combined to wean them from the faith of their ancestors. They are great imitators and respecters of more civilized races, and, so far as I can judge of their idiosyncrasy, would have been very likely to cast aside their old ideas and superstitions, if ridiculed by the whites, who, being fur traders and not missionaries, were far less likely to impart to them the Christian truths instead. They would thus have gradually and imperceptibly moved downwards to the condition of having no religion whatsoever.

It is now many years since the Roman Catholic priests first instructed the Beavers, Cariboo Eaters, Chepewyans, and Yellow Knives; and although it is only four years since the Slave communities came under the direct influence of the gospel, still, from intercourse with the others, their superstitions had, in a good measure, either faded away or been imbued with a considerable quantity of the ideas derived from the sacred writ. When the Christian religion spreads, as it certainly will in a very short time, among the eastern, northern, and mountain Tinnéh, their former faith will become a dream, and all traces of its existence be lost to the inquiring ethnologist. No heathen people, in my opinion, offer an easier field to the enterprise of missionaries. Their teaching will meet with but little opposition from the theological system or superstitions of the natives, and although I have great doubts if many will become sincere Christians at heart, they will at least submit willingly to the outward semblance of religion and conform to its ceremonies in a highly plausible manner. Their knowledge of a First Great Cause, the Maker and Ruler of the Universe, is very faint, yet I think it has always existed; but as they have no idea of a future state of rewards and punishments, this credence, if they possess it, exercises neither power nor control over their actions, and appears to be of about as much use in their mythological system as the Great Mogul was in modern times to the government of Hindoostan. Their religion is one of fear. They deprecate the wrath of demons, but no abstract notion of a single evil principle, antagonistic to and at war with the good one, appears to exist among them. The demons are, among the unsophisticated and unchristianized natives, many in number. They people

the woods and streams, haunt desert and lonely localities, and moan among the caches of the dead. To propitiate these spirits, offerings are made of some trifling and invariably very worthless article. This is hung upon a bush or tree, and among the tributes of this kind, which I have seen, may be mentioned strips of cotton, worn-out shoes, tattered robes, pieces of leather, and old belts, whose perfectly worthless character showed plainly that though these Indians have a sneaking, superstitious fear, it is not sufficiently strong to overcome the avarice that forms so predominant a trait in their character.

An inferior species of "totemism" obtains among them. Each hunter selects, as a species of familiar spirit, some animal, and invariably a carnivorous one. According to their custom, the man can then neither eat nor skin, and if avoidable, not even kill the object of his choice. The taking of the "totem" is not, so far as I am aware, the occasion of any religious ceremony, as is the case among some of the plain tribes. Pictures of various animals used in the olden day to be distributed among the natives by the traders, each individual receiving that of his totem. When a hunter had been unsuccessful he pulled this picture out of his medicine bag, laid it before him, and taking some tobacco from the same receptacle, paid adoration to the spirit by smoking and making it a speech. After this proceeding he returned with renewed ardor to the chase, and generally with success.

Fatalism appears to be deeply seated in their minds. They usually accept such luck as is sent them, if not without murmuring, at least apathetically, and make but few struggles to combat adverse circumstances.

There does not appear to be any regular order of priesthood. Any one who feels inclined to do so turns medicine man, but some are much more highly esteemed than others, as possessing greater skill in conjuring away sickness and foretelling future events. The articles by which they affect to perform many remarkable and mysterious operations are very commonplace and trifling; a flint, a piece of mica, a colored stone, or a bullet, being all equally efficacious mediums, through which to hold communication with their tutelary spirits. I have on several occasions, for amusement, tested the soothsaying powers of some of the most celebrated wizards, by requesting information as to the future arrival of boats or letters, and I can confidently state that if they guess correctly once in twenty times, it is as much as their supernatural powers are capable of effecting. As jugglers they hold a very inferior status, and do not approach, even in a remote degree, the really remarkable skill that many of the Algonquin tribes possess in this way. An idea of the powers of conjurors to kill Indians at a distance, simply by the force of their spells, was formerly common to all the race, and still exists with unabated strength among the Kutchin tribes of the Youcon river, who put great faith yet in their medicine men, and pay them liberally for their services in seasons of danger or sickness. Additional facts regarding these "doctors" will be noted hereafter, when I proceed to explain the medical theories and practice of the nation.

MORAL AND INTELLECTUAL CHARACTERISTICS.

Few of the moral faculties are possessed in any remarkable degree by the eastern Tinneh. They are tolerably honest, not bloodthirsty nor cruel; but this is, I suppose, the extent, as they are confirmed liars, far from being chaste, and have but very indistinct perceptions of doing to others as they would be done by. Some tribes are more noted for honesty than others; the Beavers and Chepewyans being at the top of the scale, the Slaves in the middle, and the Hares, Dogribs, and Yellow Knives at the bottom. The two first-named branches will compete in this respect with any European nation. No people in the world are more tenacious of what they possess themselves, or more willing to restore the property of others. On giving up what they may find to the owner, a demand for payment will sometimes be made. If the request be granted, well and good.

If not, it will make no difference afterwards as to the rectitude of their conduct on a similar occasion. In the payment of their debts, also, they evince a much greater sense of justice than the other tribes. They seldom or never dispute their accounts if they be correct, and endeavor to liquidate them to the utmost of their power. The Slaves are tolerably honest, but have great objections to clear off old debts, giving for a reason that the articles purchased are already worn out. The remaining tribes cannot be said to have a very keen perception of the rights of property, and are apt to reverse Prudhomme's celebrated dogma, "*la propriété c'est le vol*," into "*le vol c'est la propriété*." Among all the branches of the eastern division, there is no law to punish theft further than restoration; or if that cannot be had, purloining in return an article of similar or greater value. They do not, however, in general, steal much among themselves. The taking of provisions from "caches" in times of scarcity is reckoned perfectly lawful, but only the direst extremity will cause them to plunder those of the Hudson's Bay Company.

In the fabrication of false reports, and in the utterance of lies to serve their own interests, they are great adepts. The former is generally done from a wish to "cram," and is often rather ludicrous, but in the latter they evince a complete disregard for truth, and never appear in the least degree ashamed when taxed with it. There appears, indeed, to be a strong natural proneness to exaggeration in the minds of the eastern Tinnéh, and a warped bias towards falsehood, even when a correct statement would equally serve their purpose. The smallest accident becomes in their narration magnified into truly horrific proportions, and on hearing of some terrible case of starvation or disaster from them, it is necessary to take it "*grano salis*," as I have on several occasions seen the murdered restored to life, and the starved to death jolly and fat.

As a whole, the race under consideration is unwarlike. The Chepewyans, Beavers, and Yellow Knives are much braver than the remaining tribes. I have never known, in my long residence among this people, of arms having been resorted to in conflict. In most cases their mode of personal combat is a species of wrestling, and consists in the opponents grasping each other's long hair. This is usually a very harmless way of settling disputes, as whoever is thrown loses; yet instances have occurred of necks having been dislocated in the tussle. Knives are almost invariably laid aside previous to the contest. Some of the Chepewyans box tolerably well, but this method of fighting does not seem to be generally approved of, nor is it much practiced. On examination of the subject closely, I am disposed to consider that this peaceful disposition proceeds more from timidity than from any actual disinclination to shed blood. These Indians, whether in want or not, will take the life of any animal, however useless to them, if they be able to do so, and that they can on occasion be sufficiently treacherous and cruel is evinced by the massacre at St. John's, on Peace river, and at Fort Nelson, on the Liard river. It may not be out of place here to give a brief account of the latter catastrophe:

In 1811 the post of Fort Nelson, on the Liard river, was in charge of a Mr. Henry, a well educated and clever man, but of a hasty temper and morose disposition. While equipping the Indians in the autumn, he had a violent dispute with one of the principal chiefs of the Bastard Beaver Indians resorting to the establishment, who departed greatly enraged and muttering suppressed threats, which were little thought of at the time. In the winter a "courier" arrived at the fort to inform the whites that there were the carcasses of several moose deer lying at the camp ready to be hauled, and requested dog sleds to be sent for that purpose. Mr. Henry, never in the least suspecting any treachery, immediately despatched all the men and dogs that he could muster. On their way out they met an Indian, who told them that they had better turn back, as the wolverines had eaten all the meat. This information, as it turned out, was given from a friendly motive; but fear of ulterior consequences to himself pre-

vented the man from speaking more plainly. The fort interpreter, who was of the party and who all along suspected something more than appeared upon the surface, took the precaution to carry his gun with him, and when they drew near to the path which led from the bed of the river to the top of the bank where the Indians were encamped he lingered a little behind. On the others mounting the ascent they were simultaneously shot down, at one discharge, by the natives who were in ambush awaiting them. When the interpreter heard the shots he was convinced of foul play; he therefore turned and made for the fort as quickly as he could, pursued by the whole party of savages, whose aim was to prevent him from alarming the establishment. The man was a famous runner, and despite the disadvantage of small tripping snow-shoes, which permitted him to sink more deeply than the Indians, who, on their large hunting snow-shoes, almost skimmed over the surface of the snow, he would have reached the houses before them had not the line that confined the snow-shoe on his foot broken. His enemies were too closely upon him to allow time for its repair, so, wishing to sell his life as dearly as possible, he levelled his gun at the nearest Indian, who evaded the shot by falling upon his face, whereupon the whole party made up and despatched him. After perpetrating this additional murder the band proceeded to the fort, which they reached at early dawn. A poor old Canadian was, without suspicion of evil, cutting fire-wood at the back gate. His brains were dashed out with their axes, and they entered the establishment, whose inhabitants, consisting, with one exception, of women and children, were buried in profound repose. They first opened Mr. Henry's room where he was asleep. The chief pushed him with the end of his gun to awaken him. He did so, and seeing numerous fiendish and stern faces around him, made a spring to reach a pair of pistols that were hanging over his head; but before he could grasp them, he fell a bleeding corpse on the bosom of his wife, who, in turn, became a helpless victim of the sanguinary and lustful revenge of the infuriated savages. Maddened by the blood, and demons in heart and act, they next proceeded to wreak their vengeance on the innocent women and children, who expired in agonies and under treatment too horrible to relate. The pillage of the stores was the next step, after which they departed, leaving the bodies of the dead unburied. No measures further than the abandonment of the fort for several years were taken by the Northwest Company, to whom the establishment belonged, to punish the perpetrators of the atrocious deed, yet it is a curious fact that when I visited Fort Liards in 1849, but one of the actors survived, all the others having met with violent deaths, either by accident or at the hands of other Indians. This man, who was at the time only a lad, confessed to have dashed the brains out of an infant, taking it by the heels and swinging it against the walls of the house.

The fear of enemies, when in these peaceful times there are none to dread, is a remarkable trait of the timidity which so strongly influences the minds of the eastern Tinneh. It is, I conjecture, a traditional recollection of the days when the Knisteneaux or Crees made annual forays into the country of the Tinneh, pushing so far as Bear river in search of scalps and plunder, when the Yellow Knives bullied the Slaves and Dogribs, and the Beavers warred with the Sickanies. A strange footprint, or any unusual sound in the forest, is quite sufficient to cause great excitement in the camp. At Fort Resolution I have on several occasions caused all the natives encamped around to flock for protection into the fort during the night by simply whistling, hidden in the bushes. My train of hauling dogs also, of a large breed and great hunters, would, in crashing through the branches in pursuit of an unfortunate hare, frighten some women out gathering berries, who would rush in frantic haste to the tents and fearfully relate a horrific account of some strange painted Indians whom *they had seen*. It was my custom in the spring, during the wild fowl season, to sleep outside at some distance from the fort. Numerous were the cautions that I received from

the natives of my foolhardiness in doing so, and when they found that I escaped with impunity, they accounted for the circumstance to their own satisfaction by saying that I had bribed the "bad Indians to leave me alone."

The race under consideration must be regarded as far from chaste, as continence in an unmarried female is scarcely considered a virtue, and its want brings no discredit on the individual. The intercourse between the sexes begins very soon. This is easily accounted for by their hearing and seeing so much that they should not at a very early age, which ripens their instincts at an earlier period than either their temperament or the climate of the country would warrant. Their dispositions are not amatory, and, in the case of the females, the love of gain is a much stronger incitement to immorality than any natural warmth of constitution. The divine and customary barriers between blood relations are not well observed, for, although it is not considered correct by general opinion, instances of men united to their mothers, their sisters, or their daughters, though not common, are far from rare. I have heard among them of two sons keeping their mother as a common wife, of another wedded to his daughter, and of several married to their sisters, while in cases of polygamy having two sisters to wife is very usual. The married state, easily entered upon and involving few duties and responsibilities, is but a slender guarantee for the mutual faithfulness of the sexes. A Tinnah woman, however obedient she may be to her taskmaster as regards labor, considers herself quite at liberty to dispose of her personal favors as she may wish, which latitude is not at all agreed to by her husband, who, while claiming and exercising quite as much freedom for himself, severely punishes his wife if she forgets in a single instance the allegiance due, in his opinion, to him alone. The custom of robbing one another of their wives, or of fighting for them, the facilities for divorce, and the inferior estimation in which women are held, combine to produce a very lax condition of the marriage ties, and to originate a low state of morality, which will doubtless improve gradually as the operating causes are neutralized or done away with by the exertions of missionaries and advance of Christianity.

The instinct of love of offspring, common to the lower animals, exists strongly among these people, but considerably modified by the selfishness which is so conspicuous a feature in their character. In sickness they appear to sympathize strongly and to take great interest in the sufferer, so far as lamenting and crying goes; but their affection is seldom strong enough to induce them to do anything that would either tax their comforts much or require great exertion. On arriving at mature age the bond between relatives is easily broken, and even in adolescence often but scanty deference is paid to parents. The parental instinct, though far more strongly developed in the mother than in the father, would, I am confident, never call forth such traits of self-sacrifice, even to death, as have been exhibited many times among civilized and even barbarous nations. Male children are invariably more cherished and cared for than females. The latter are mere drudges, and obliged on all occasions to concede to their brothers; and though female infanticide, formerly so prevalent, is now unknown, still in seasons of starvation or times of danger, girls invariably fall the first sacrifices to the exigencies of the case. The death of a child is apparently not much regretted, the mourning is short, and although in after years a mother will lament her offspring bitterly, there is far more of custom than reality in the exhibition, and it rarely proceeds from the heart. The relation on the part of the children is still more soulless. Only in early age do they pay much attention to the commands of their parents, and the control of the latter is soon loosened. A curious circumstance is, that children are treated exactly as grown-up people, and talked to as such; but as the character of all ages is decidedly childish, it is not to be wondered at if such a manner suits all parties equally well.

As these people are obliged to lead a very wandering life, in order to procure food either by fishing or hunting, there can be, and in fact is, but little or no

attachment to particular localities existing in their minds, though they have a strong bias towards their mode of life. The latter sentiment does not retain nearly so strong a hold on their dispositions as it does on most savage nations. Wedded to ancient manners and customs by much more slender ties than exist in the generality of Indian tribes, they easily fall into the habits of Europeans, and, in cases of servants engaged from among them by the Hudson's Bay Company, willingly abandon the charms of freedom and the chase for the more regular comforts and daily avocations of civilized life. I judge from this that if these tribes were properly instructed and located in a more favorable climate, they would become tolerable husbandmen, and without acquiring the ferocity of their congeners, the Navajoes, soon surpass them in agricultural skill and herdsman'ship.

2.—THE LOUCHEUX INDIANS.—*Hardisty.*

The physical characteristics of the Loucheux nation are, with few exceptions, the same as those of the other aborigines of North America. The skin is commonly of a sallow brown tint, in some cases what might be called a yellowish white; the hair is long, black, and lank; the beard scanty, with rare exceptions. They have black deep-set eyes, receding foreheads, high cheek bones, high, aquiline noses and large mouths with tumid lips. The eyes are of a dark hazel color, often approaching to black, frequently small and oblique, though I have noticed particular individuals with very large eyes, while in others the eyes were remarkably small and these invariably oblique.

The Loucheux language is a dialect of the Chepewyan, which it more closely resembles than the intervening dialects of the Hare Indians and Slaves, although a very slight intercourse enables the latter also to understand the former sufficiently for the ordinary purposes of traffic. The Loucheux proper is spoken by the Indians of Peel's river, thence traversing the mountains westward down Rat river, the Tuk-kuth, (Rat Indians,) and Van-tah-koo-chin, it extends to the Tran-jik-koo-chin, Na-tsik-koo-chin, and Koo-cha-koo-chin of the Youcon. All the tribes inhabiting the valley of the Youcon understand one another; a slight difference of accent being all that is perceptible in their respective dialects. The first material change occurs among the "Gens de Fou" or Hun-koo-chin, (river people.) These make use of a great many words in common with the "Gens de Bois," who again understand the language of the "Mauvais Monde" of Francis lake, which is the common language of the Mauvais Monde of Fort Halkett, the Thikanies, the Ah-bah-to-din-ne (mountain Indians) and Nahau-nies of Forts Liard and Simpson.

The Loucheux, though sunk in barbarism, are rather more intelligent than the other tribes composing the great Chepewyan nation, owing no doubt to their intellectual faculties being more frequently brought into active play in their traffic and intercourse with other tribes. They are essentially a commercial people, and live by barter, supplying their wants by exchanging their beads, which form the circulating medium, for the peltries of the neighboring tribes, to whom they go on periodical trading visits. They hunt no furs, but are, nevertheless, good hunters, and invariably well supplied with provisions, unless when some very unfavorable circumstances may have occurred to prevent success in the chase. They are great talkers and very fond of displaying their eloquence. They are always making public harangues, and in the figurative language they use, their speeches are not ineloquent nor void of sense. Their delivery is good, but the effect is spoiled by their gradually raising their voices to such a high pitch as to be compelled to stop before they come to the end of their speech from sheer want of breath. After a minute or two they begin again in a lower key, and gradually raising their voices as they proceed and get excited; they finally close their harangues with a most infernal screech, which is particularly disagreeable to a white man's ears.

The Loucheux generally live in large parties, each band headed by a chief and one or more medicine men. The latter, however, do not possess any secular power as chiefs, but they acquire an authority by shamanism to which even the chiefs themselves are subject.

All the chiefs, medicine men, and those who possess rank acquired by property have two, three, or more wives, so that only few of the young men have wives, unless they can content themselves with some old cast-off widow, who, from ill health and the effects of bad treatment, is no longer able to perform heavy work. The consequence is that those who have wives are invariably jealous, and treat their women most brutally. It is one of the principal causes of the great falling off of the Loucheux nation. They are not half the number they used to be. The other causes of the decrease in the population are female infanticide, and premature birth and very frequent miscarriages from over exertion, &c. Infanticide is caused by the misery of the women—at least, this is the only reason they give for it. When questioned on the subject, they invariably give the same answer, "that they love their children, and destroy them only to save them from the hardships and misery to which their mothers are exposed in this life." To preserve them alive is equivalent to the unnatural crime of a mother wilfully placing her daughter in misery. When a young man has acquired the means, he purchases a young girl (perhaps an infant) from its mother, who has the power to dispose of her daughter to whom she pleases, though no doubt she will sometimes consult the wishes of her husband. The fathers and brothers have no voice in the matter by the laws of the tribe. The females are fewer than the men, especially when young, and might be considered pretty, but they get proportionably coarse and ugly as they grow old, owing to hard labor and bad treatment. The very low position which they occupy in the social scale, is a sign of the depth to which the Loucheux are still sunk in barbarism. The women are literally beasts of burden to their lords and masters. All the heavy work is performed by them. When an animal is killed, they carry the meat and skin on their backs to the camp, after which they have the additional labor of dressing the skin, cutting up the meat and drying it. They are the drawers of wood and water; all the household duties devolve upon them; they have to keep up the fires, cook, &c., besides all the other work supposed to belong to the women, such as lacing the snow shoes for the family, making and mending their husband's and children's clothes, &c. In raising the camp, or travelling from one place to another, if, in winter, the woman hauls all the baggage, provisions, lodge poles, cooking utensils, with probably a couple of children on the top of all, besides an infant on the back, while the husband walks quietly on ahead with his gun, horn and shot-pouch, and empty hunting bag. In the summer the man uses a small light hunting canoe, requiring very little exertion to propel it through the water, while the poor woman is forced to struggle against the current in a large ill-made canoe, laden with all the baggage, straining every nerve to reach a particular place pointed out beforehand by her master as the intended camping ground.

They are a lively, pleasant race, and have many rules and regulations, which are strictly adhered to both in public and private life. Their games and pastimes are more manly and rational than those of the dull, apathetic Slaves. They are passionately fond of dancing, wrestling, running, &c., in all which sports the women, especially the younger, take a part. Their dances, which are accompanied by singing, are not void of harmony, as they keep time with their bodies, beating cadence with their feet, and moving themselves in grotesque though not unpleasant postures, which are apparently rather difficult to perform, as they perspire profusely. Their wrestling matches are commenced generally by two little boys. When one of them is thrown he retires and another, a little bigger, takes his place. As soon as he has thrown his opponent he rises up quickly and places himself in preparation for the next, who will make a sudden

rush at him so as to get an advantageous hold before he is prepared and while still panting from his previous exertion. Still if he be the stronger or more expert, he may knock down his second adversary, also the third or perhaps a fourth before he is thrown, when he retires and leaves the field to his conqueror, who in his turn will continue to throw as many as he can, one after the other, until he, too, perhaps from exhaustion, is obliged to give way to a fresher or more vigorous opponent. The combatants rise in gradation until all the men have had their turn, and one, the last, remains alone on the ground with the honor of being the best wrestler of the tribe. Afterwards two little girls begin in their turn and so on until all the women also have been thrown, except one who remains to claim the approbation of her male friends. In winter time they have a most amusing, though rather unsafe, game to those who are unacquainted with it. Four trees are selected, forming as nearly as possible a square of about thirty feet, to which strong leather cords are tied diagonally as tight as possible, about twenty feet from the ground. Where the cords cross a piece of leather about eight inches square is tied securely, on which each in his turn is required to stand. The least pressure sends the person up in the air perhaps a couple of feet, when he comes down the second time on the piece of leather. The cords being suddenly distended with his weight, the "contre coup" will shoot him up perpendicularly in the air, perhaps a dozen feet. Now is the time of danger, for if he is not expert, or has not been able to keep himself straight, he may come down a height of perhaps twenty or thirty feet on his head to the ground. The object is to see who will fall oftenest perpendicularly on his feet on the little leather table without breaking his neck, I might say, or tumbling on one side to the ground to the amusement and uproarious laughter of the others.

They are hospitable, but more, I think, because it was a custom of their fathers than from real generosity. After the first day, during which a guest is served with the best they have, and welcome, he may remain for months with them without rising above the salt, as it were, unless indeed he be a chief, or a man of consequence—that is, one with plenty of beads, or more especially a medicine man, but even then only for a time. Avarice is certain to get the better of their fears in the end. Each head of a family is expected to, and does, act the host for the whole band in his turn, day about. Whether they do so in rotation or how it is managed I was never able to find out. Whether invitations are sent, or the fact of any particular person putting all the kettles in camp in request apprizes the others which is to be the general eating-room of the day, I cannot say. At all events, all the males, from the oldest to the youngest, are drawn as if by magic to the point of general attraction. They continue falling in until the lodge is crammed; the more the merrier; the greater the pressure, the better the host is pleased. The favored or principal guest sits on the host's right hand, the next on his left, and so on downwards to the fourth or fifth on each side of him. The sixth downward are considered to be below the salt. The next rule observed is to divide or carve the meat properly according to rule. The best and fattest pieces, the titbits, are piled in a heap before the principal guest, who, after he has satisfied his hunger, sends the rest to his own lodge for his wife and children. The person on his left hand gets the next best pieces and sends what he leaves to his family, and so on downwards to the salt, below which the meat is distributed as it comes, without selection. Every fowl, every animal and part of an animal, must be divided or carved in a particular way, and if any person evince ignorance or inexpertness it excites the laughter and ridicule of the rest. One may be a principal guest with one host, and yet sit fourth or fifth or even below the salt with another. All goes by relationship or the estimation in which the person is held by the particular host for the time being. The host himself does not eat on that day beyond taking one mouthful, tasting the meat before helping the head guest. Should he eat

anything more, he would be considered very mean and ridiculed accordingly. He may get his wife to cook something for him after the guests have left, but not before, and it may be some time before they do leave, especially if there be anything to talk about, for after they have all eaten and drank, the host is obliged by rule to cut up tobacco and fill every pipe. The wife cuts the wood and cooks and collects all the pans. During the repast she sits at the door, if she can find room, and outside if not, to hand to her husband whatever he may ask for.

This apparent abnegation of self is perceptible through all their regulations. For instance, unless he is alone a hunter cannot take and appropriate the meat of the animal he kills. Should he do so he would be considered mean. And this feeling is so strong that I could not induce them to abolish the custom during the long time I remained among them, so much do they dread the idea of being thought mean with regard to anything eatable. When two *good* hunters go together, good and well—the one has as good a chance of getting meat as the other; but when one is a bad hunter and the other a good one the former gets all the meat and the real hunter has nothing, and loses his ammunition into the bargain.

Although hospitable to a certain extent as far as food is concerned, their natural character is selfish. (But where will you find an Indian who is not?) They would not part with half a dozen common beads for nought, and are keenly alive to the ridicule attached to a bad bargainer. They will harangue and protest for days against what they consider (all honor and honesty apart, of course) an inadequate payment for what they give. They will have recourse to every subterfuge, even intimidation, to have the best of a bargain, and will do all in their power to fleece their opponent, and boast about it afterwards.

The wife is expected to furnish the skins required for the clothing of the whole family, either by dressing the skins of the animals killed by her husband, or by purchase from others with *her own beads*—that is, her marriage portion, or what she may have had on her person or dress when she was married, and what she may have received from time to time from her husband for good conduct, or, probably, when he happened to be in an unusually good and generous humor. She supplies all the beads or wampum required for ornamenting the dresses of all the family, including her own and even her husband's. *His* beads are the family fortune, the capital which cannot be touched except for purposes of traffic or for payment of *doctor's bills*, &c.—that is, paying the medicine-man in time of sickness and for producing wind and favorable weather in times of scarcity. The first time a Loucheux saw a blacksmith's bellows he, of course, reported to his friends all particulars regarding the ironmaker's blowing machine. Some time after a medicine-man came to me secretly to inquire the truth, whether it would be possible for him to purchase, and the price of this wonderful wind-producing machine of the ironmaker's, and whether it could be turned to account in making wind for hunting moose in cold weather, for, being a medicine-man, he was expected to make wind when it was required, and if he could only get this wonderful wind-maker, which he had heard so much about, his reputation would be at its height, and his fortune made.

The Loucheux have a number of legendary stories, but generally of such an obscene character as not to merit mention here. Even the story regarding caste, or the regulation which divides mankind (the people, Loucheux) into three different grades, is of a filthy character. They believe the heavens to be a walled canopy encircling the world. There are people above this canopy who in former times used to visit the earth, and on several occasions carried off women with them to the celestial regions. The women, however, it seems, did not find this paradise such a place of bliss as to wish to remain there. They regretted the pleasures of this lower world of ours, and after a time hit upon the expedient of boring the heavenly canopy. Then secretly collecting all the cords

they could find, they tied the end to a stone somewhat larger than the orifice, and by this means lowered themselves to the earth. The story goes on to say that the cord was just long enough, but, unfortunately, they found themselves over a lake, and might have been drowned after all had it not happened that an Indian was passing in a canoe at the time, and saved them from their perilous situation.

With reference to the story about caste it is difficult to arrive at a correct solution of the matter. The fact, I believe, is that they do not know themselves, for they give various accounts of the origin of the three great divisions of mankind. Some say it was so from the beginning; others that it originated when all fowls, animals, and fish were people—the fish were the *Chitsah*, the birds *Tain-gees-ah-tsah*, and the animals *Nat-singh*; some that it refers to the country occupied by the three great nations who are supposed to have composed the whole family of man; while the other, and, I think, most correct opinion, is that it refers to color, for the words are applicable. *Chitsah* refers to anything of a pale color—fair people; *Nat-singh*, from *ah-zingh*, black, dark—that is, dark people; *Tain-gees-ah-tsah*, neither fair nor dark, between the two, from *tain-gees*, the half, middle, and *ah-tsah*, brightish, from *tsa*, the sun, bright, glittering, shining, &c. Another thing, the country of the Na-tsik-koo-chin is called Nah-t'singh to this day, and it is the identical country which the Nat-singh occupied. The Na-tsik-koo-chin inhabit the high ridge of land between the Youcon and the Arctic sea. They live entirely on the flesh of the reindeer, and are very dark-skinned compared with the Chit-sangh, who live a good deal on fish. All the elderly men fish the salmon and salmon trout during the summer, while the young men hunt the moose, and have regular white-fish fisheries every autumn besides. Some of the Chit-sangh are very fair, indeed, in some instances approaching to white. The Tain-gees-ah-tsa live on salmon trout and moose meat, and, taken as a whole, are neither so fair as the Chit-sangh nor so dark as the Nah-t'singh. They are half-and-half between the two. A Chit-sangh cannot, by their rules, marry a Chit-sangh, although the rule is set at naught occasionally; but when it does take place the persons are ridiculed and laughed at. The man is said to have married his sister, even though she may be from another tribe and there be not the slightest connection by blood between them. The same way with the other two divisions. The children are of the same color as their mother. They receive caste from their mother; if a male Chit-sangh marry a Nah-tsingh woman the children are Nah-tsingh, and if a male Nah-tsingh marry a Chit-sangh woman the children are Chit-sangh, so that the divisions are always changing. As the fathers die out the country inhabited by the Chit-sangh becomes occupied by the Nah-tsingh, and so on vice versa. They are continually changing countries, as it were. Latterly, however, these rules are not so strictly observed or enforced as formerly, so that there is getting to be a complete amalgamation of the three great divisions, such a mixture that the difference of color is scarcely perceptible, and, no doubt, will soon disappear altogether, except what is produced by natural causes. The people who live on the flesh of the reindeer are always darker than those who live on fish, or on part fish and part flesh. One good thing proceeded from the above arrangement—it prevented war between two tribes who were naturally hostile. The ties or obligations of color or caste were stronger than those of blood or nationality. In war it was not tribe against tribe, but division against division, and as the children were never of the same caste as the father, the children would, of course, be against the father and the father against the children, part of one tribe against part of another, and part against itself, so that, as may be supposed, there would have been a pretty general confusion. This, however, was not likely to occur very often, as the worst of parents would have naturally preferred peace to war with his own children.

As a rule slavery does not exist among the Loucheux, but the orphan and the

friendless are kept in servitude and treated so harshly as to be really little better than slaves, until such time as they get big enough and bold enough to assert their independence, when they are allowed to shift for themselves.

The Loucheux are very superstitious, and place implicit faith in the pretended incantations of their medicine-men, for whom they entertain great fear. When a death occurs they make loud expressions of grief. They accompany their lamentations with a song or dirge, in which they enumerate all the good qualities of the deceased, and when they have raised themselves to a fit of ungovernable fury and excitement, a medicine-man will adroitly and imperceptibly raise the idea that the person's death was caused by a medicine-man of a neighboring tribe, or if a disinterested person do so for him, so much the better, as it draws away suspicion from himself. On such occasions the relatives of the deceased will immediately take a quantity of beads to the conjuror, and entreat him to find out who the hidden enemy really is, and the particular reason of the death of their friend, so that they in their turn may know in what direction to turn the shaft of revenge. When a person of consequence is sick, he will frequently receive a visit of condolence from a medicine-man of a neighboring tribe. As a mark of respect for the stranger he is invariably employed to recover the sick person, being of course well paid in beads for his trouble, to the exclusion and great displeasure of the native "doctor," who is sure to find some means to be revenged on the intruder for the slight he has received, and the loss he has sustained. On such occasions there is frequently a row, after, if not before, the departure of the visitor, for his opponent will secretly endeavor to make the impression that some medicine-man, or perhaps the favored guest himself is the real enemy of the sick person. When these insinuations and stories begin to take effect, the guest seizes the first favorable opportunity to take his departure, for he has a sufficient knowledge of the Loucheux human nature to be aware that in moments of great grief or excitement the slightest whim or chance may direct the popular fury towards himself. If he gets off safe, he goes on his way rejoicing under a good load of beads and thinking good humoredly on the acquisition he has made to his wealth, and the power and influence it will give him among his own tribe, riches being the talisman with the Loucheux as well as others. The power of the medicine-men is very great, and they use every means they can to increase it by working on the fears and credulity of the people. Their influence exceeds even that of the chiefs. The power of the latter consists in the quantity of beads they possess—their wealth and the means it affords them to work ill to those to whom they may be evil-disposed; while the power of the medicine-man consists in the harm they believe he is able to do by shamanism, should they happen to displease him in any way. It is when sickness prevails that the conjuror rules supreme; it is then that he fills his bead bags and increases his riches. Some near relative of the invalid, or, as often happens, some other person, to court popularity, will give him a quantity of beads to save the sick person or to ascertain his probable death or recovery. Of course the medicine-man, from the symptoms of the malady or from appearances, has already decided on the answer he is to give in the event of his being employed in the matter, and from long practice and observation he generally becomes an adept in predicting the final death or recovery; for even if the worst be foretold, he is perfectly aware that the friends of the sick person, so far from sparing their beads and losing all hope, will, on the contrary, rather give even more to avert the doom.

But the medicine-man has other ways of increasing his means. When practice becomes low, and the people seem to forget that their prosperity, their health, and even their lives are in his hands, among other tricks he will probably take a pretended nap during the day, and when he awakens will inform those near him that such and such a person will, in his opinion, soon die. This he does in an ambiguous way, without particularly mentioning the person's name,

but in such a manner that it is perfectly well understood by all who is referred to. As soon as it is dark, for they never conjure in the daytime unless in cases of great emergency, the doomed person goes to the doctor with his beads, makes a short speech, in which he extols the power and ability of the doctor, laments the fate which threatens himself, and finally presents him with his beads and entreats him to retard, or, if possible, prevent the doom which awaits him. The doctor replies that he is sorry to give him pain and would not wish to take his beads for nothing, that it is probably a mistake, and may even refer to some other person. In his wanderings among his medicinal spirits, or familiars, he merely observed a shade which overhung a particular individual, still it may not indicate anything serious, but he will ascertain correctly during the night and let him know. In the mean time he retains the beads with a secret determination that they shall not leave his possession in future. I have known several fall sick and actually die from the effects of such stories on the imagination, while in other cases it was with the greatest difficulty I could remove the impression produced on their minds by these threatened calamities. The prediction invariably told most fearfully on the imagination, producing first low spirits, languor, then sickness, particularly in bilious subjects, and very frequently even death. When such things occur, the character and power of the cunning rogue has reached its height, and he is ever after looked upon with fear and respect, and consulted with confidence. No hunting excursion, no voyage, nothing, in fact, is undertaken without consulting him. Often have I known a party of Indians on the eve of starting to pass the winter or summer at some place favorable for hunting, when a medicine-man would suddenly set all their plans at naught by circulating the idea that starvation, sickness, death, or other misfortune awaited them in that particular direction, while he would cunningly recommend them some other place, which, from knowledge of the country, proximity to his own lands, or in some way or other was more suitable to his own views.

When any of their relations die all their beads which have not been given to the medicine-man, or otherwise destroyed or disposed of to show their grief, and the estimation in which the deceased was held, are either buried with the body or broken up, and the fragments sprinkled about the grave, or, what of late has been customary, they are kept to be finally distributed among the Indians at the dance for the dead, which takes place nine or twelve months after interment, when their mourning and all outward tokens of grief are supposed to end. All the beads they have on their persons are also distributed in this way, or destroyed, together with their clothes. Their hair is cut close to the head or singed, which certainly gives them the appearance of miserable, grief-stricken wretches. Sometimes too they will cut and lacerate their bodies with flints, or, as sometimes happens, they will, in a fit of revenge against fate, stab some poor, friendless person who may happen to be sojourning among them. Those who bury the dead receive a quantity of beads in payment, but fear of the lifeless body makes them averse to the office, and they generally endeavor to evade being selected to perform the service, owing to the restrictions imposed by their rules on all those who are selected to perform that duty. For instance, they must not eat fresh meat, unless the absence of every other kind of food renders it absolutely necessary to preserve life, and that only when it is cold. They must tear the meat with their teeth, the use of a knife being prohibited. They must drink out of a gourd, carried for the purpose, as they are not allowed to slake their thirst out of any drinking or cooking vessel. Those, too, who have handled a dead body wear peeled willow wands round the arms and neck, or carry peeled willow wands, about two feet long, in their hands. These are supposed to keep off infection, and to prevent any evil effect which might follow the handling of a deceased body. After a certain time subsequent to the death of a relative, the nearest of kin to the deceased, if a man of wealth, makes a general festival for the dead—the “dead dance”—when he distributes the rest of his beads—his

whole fortune—to his countrymen, half of what each receives to be returned either in beads or furs after a year, to enable the person who makes the festival to begin the world afresh after he has completed his term of mourning. In the mean time he makes every exertion to collect a quantity of good meat. Invitations are sent to all the neighboring tribes; a level piece of ground is fenced round, and the beads are strung and neatly hung up on painted cross poles within the enclosure. During this time, also, he composes the songs to be used on the occasion, in which all the good qualities of the deceased are enumerated, his abilities as a hunter are extolled, and any good or praiseworthy act he may have committed during life is held up as an example for the imitation of others. When the guests have assembled, early on the following morning, every one cleans and paints himself; fires are lighted within the enclosure; several are set to cook, others to cut up tobacco, while the rest are dancing to the songs of the host and his wives, who, all the time, beats cadence on a piece of painted wood he holds in his hand. After they have had their repast and smoked their pipes the singing and dancing recommence, in which they all join. They then throw a bladder of grease among the crowd. The first who seizes hold of it runs away as fast as he can, pursued by all the rest. When he finds himself hard pushed he endeavors to secure at least a piece for himself, but this is not easy to do, as the grease is mixed up with sinew, which makes it very difficult to break, so he must either endeavor to outrun his pursuers or be content to part with it to the hungry multitude behind. By this time he is getting exhausted, and he tries to double on the others; but, among such a number, it is hardly possible to escape, and he will either stop or throw the grease on one side, when there is a general scrambling for it, accompanied by screams and a noise that is deafening. After going on in this way for a time they will quietly eat the grease, and then return to the enclosure, when a moose skin will probably be thrown among them. The smartest will seize and run away with it in order to secure it for himself, doing as was done with the grease; but this time every one that can catch hold of the skin, while one seizes a knife and cuts away between the hands, until each finds himself possessed only of what he was able to grasp. This goes on for several days, accompanied by wrestling, pushing on a strong pole, fifty or sixty against an equal number, racing, &c. After this the beads are distributed as before stated, the fence is pulled down, harangues are delivered, strong professions of eternal faith and good will are made, when each party takes its departure for its own land, and the term of mourning is at an end.

Their knowledge of a Supreme Being, if they have any at all, is very limited. They know nothing of the soul. They say man has reason, acquired from education, imitation, or experience, which increases with age; for instance, they say a child has no education, no experience—that is, no reason; or if he has, it is so weak or imperfect that he will crawl straight into the fire without the slightest fear of the consequences. If he had a soul, which is part of the Great Spirit himself, he would be as wise when born as at any time of his life; more so, in fact, for he is purer, having just come from his Maker. Neither would he require education or experience to guide him through life. They believe in a future state of rewards and punishments—that is, they believe they will be successful or unfortunate in the world to come according as they have acted well or ill in this; that those who have been poor and miserable in this world, if they have committed no heinous crimes, will be happy in the next; also, that the relative states of a wicked and prosperous man, and that of a poor, despised, ill-treated though innocent person, may be reversed hereafter; that the two will change places, as it were.

They have an imaginary person, a good angel, common to all, who is supposed to guard them from evil and supply their wants. This good angel is supplicated when they start on a hunting expedition, and is supposed to have the power of changing his shape and appearance. The story goes that an old woman found

him as a little boy, brought him to her camp and took care of him. This boy made a pair of large hunting snow-shoes for himself, which excited the ridicule of the men at the idea that a ragged, miserable little urchin like him should pretend to require and use such a thing. The boy, however, paid no attention to their scoffs, but continued to be kind and attentive to the old woman, his grandmother, as he called her. His origin was unknown, and he could not give any account of where he had come from. Altogether there was something mysterious about the child which kept him apart from the rest. Whenever they were in distress for want of food and their best hunters could kill nothing, some of them would fall on a fresh track, which, following up, would invariably lead them to a freshly killed animal. From this spot the track and all vestige of the unknown hunter disappeared. This continued for some time until at length suspicion fell on the strange boy and his large hunting snow-shoes. People were set to watch him, and it was found that he was in the habit of leaving the camp secretly, when the others were asleep or otherwise occupied, and returning again in the same mysterious manner. In this way he was discovered to be the unknown hunter and their benefactor. This, however, did not improve his condition with the others. He still continued to be the poor neglected and despised boy he was when they found him. After a time, in winter, the Indians killed a great number of deer. The boy asked them for a piece of fat, which in their arrogance they refused to give. That night he disappeared, and no vestige of him could be found but his clothes, which were discovered hanging on a tree. About a month after he again appeared among them as a grown-up man and well dressed. He told them that he had gone to live in the moon, from whence he would continue to afford them his protection so long as they deserved it; that when they were in distress they were to supplicate his aid, and he would send them relief, with this reservation, that in consequence of their having refused him a piece of fat when he asked them, all animals would in future be lean in winter, and fat only in summer. Since then he has continued to live in the moon, and is ever ready to answer the prayers of the hunter who demands his aid before going on a hunting expedition.

They believe in a future state of bliss, where they are to live forever, in the same bodies they occupied while here. The principal features of this paradise are pleasant hunting grounds, where there is an eternal summer, fat animals, no sickness, no death, with exemption from all labor beyond preparing the meat of the animals they kill for food; but they have, notwithstanding, a great fear of death, and a particular aversion to being buried in the ground. The idea of their bodies being destroyed by worms is horrible. For this reason they enclose the body in a neatly hollowed piece of wood, and secure it to two or more trees about six feet from the ground. A log about eight feet long is first split in two and each of the parts carefully hollowed out to the required size. The body is then enclosed and the two pieces well lashed together preparatory to being finally secured, as before stated, to the trees.

The widow or widows of the deceased are obliged to remain near the body for a year to protect it from animals, &c. When it is perfectly decayed, and nothing but the bones remain, they are burned and the ashes collected and secured in a small box, which is hung up on the end of a painted pole, with a piece of painted wood fixed in the ground to mark the last resting-place of their departed friend. After this the women are allowed to marry again. They begin to dress their hair, and put on beads and other ornaments to attract admirers, to go through the same observances again, should they a second time become widows.

Great or heinous crimes with the Loucheux are thieving—that is, wilful theft—and murder of the innocent by shamanism; also lying; yet they are much given to telling lies and speaking scandal. Employing wealth (beads) as a means of taking away life—that is, paying away beads to a medicine-man to take away the

life of another, especially if he be innocent—is a great crime, but the killing of an enemy in a fair stand-up fight is honorable, although they seldom act up to their principles. A Loucheux prefers the safest side of valor, and hardly ever makes an attack unless he is pretty certain of coming off without harm.

Formerly the young women had their chins tattooed in perpendicular lines from the corner of the mouth to the chin. Latterly the practice has been discontinued. Until the introduction of fire-arms by the Company, they made use of bows and arrows in the chase, also of twisted deerskin thongs for snaring the deer and moose. Their arms of defence were the bow and arrow and the knife; their clothing is of dressed deerskin in the summer, and in winter the same with the hair on. They live in conical lodges, rather flat at the top, made of deer-skins dressed with the hair on, as well described in Sir John Richardson's work.

3.—THE KUTCHIN TRIBES.—*Jones.*

The Kutchin may be said to inhabit the territory extending from the Mackenzie, at the mouth of Peel's river, latitude 68° , longitude 134° , to Norton's sound, living principally upon the banks of the Youcon and Porcupine rivers, though several of the tribes are situated far inland, many days' journey from either river. The Kutchin nation is very numerous, and is divided into about twenty-two different tribes, each speaking a dialect of the same language, and bearing a very great resemblance to each other in habits and customs. The dress is the same among all the tribes. According to their traditions they were created here, but their account is so intensely obscene that I fear to write it.

Character.—In this they differ entirely from the Tinnah tribes of the Mackenzie, being generous, honest, hospitable, proud, high-spirited, and quick to revenge an injury; in short, bearing a much greater resemblance to the Plain tribes than any other of the northern Indians. They were once very numerous, but wars among themselves, disease, and famine have reduced their aggregate very much. One or two of the tribes are nearly extinct.

Physical appearance.—The average height of the men is about five feet eight inches, though there are numbers six feet high. The women average five feet three inches, and are very strongly made. The color of the skin is dusky, the hair and eyes black. The men are completely destitute of beard, and both men and women are intensely ugly.

Dress.—The men's summer dress consists of a shirt, pointed before and behind, the point nearly reaching to the knee; trousers, and shoes, both sewed together, all made of dressed deer-skin without the hair. The shirt has a broad fringe of beads across the breast, and there is a broad band of beads down the front of the legs of the trousers. Both fringe and band were in former times made of Hiagua shells (*Dentalium*) or of wooden beads made from willows. The dress of the women is nearly the same, differing only in the shirt reaching below the knee and not being pointed. The winter dress is the same, but is made of deer-skin, with the hair on and turned inside. Sometimes the shirt is made of muskrat or rabbit-skin, but in this case the hair is turned outwards. Mittens of deer or sheep skin, with the hair inside, and a cap of rabbit-skin, with the hair outside, complete the winter dress. The children are dressed in the same way, but have the mittens sewed to the shirt sleeves, instead of being fastened to a line passing over the neck as in the case of the men and women, and their hood is fastened to the shirt, and draws off and on like the hood of a Canadian capote. The men paint themselves with vermilion in lines across the face; they use also a kind of powder from the mountains exactly resembling black lead; they powder their hair with goose down and a kind of red earth during their feasts. The women tattoo their chins with lines from the mouth to the throat by puncturing the skin and rubbing in the black powder mentioned before. The men always, and the women sometimes, bore a hole in the end of the nose, between the nostrils, and insert an ornament into it. Among the Kut-cha-Kutchin, Vondt-way-

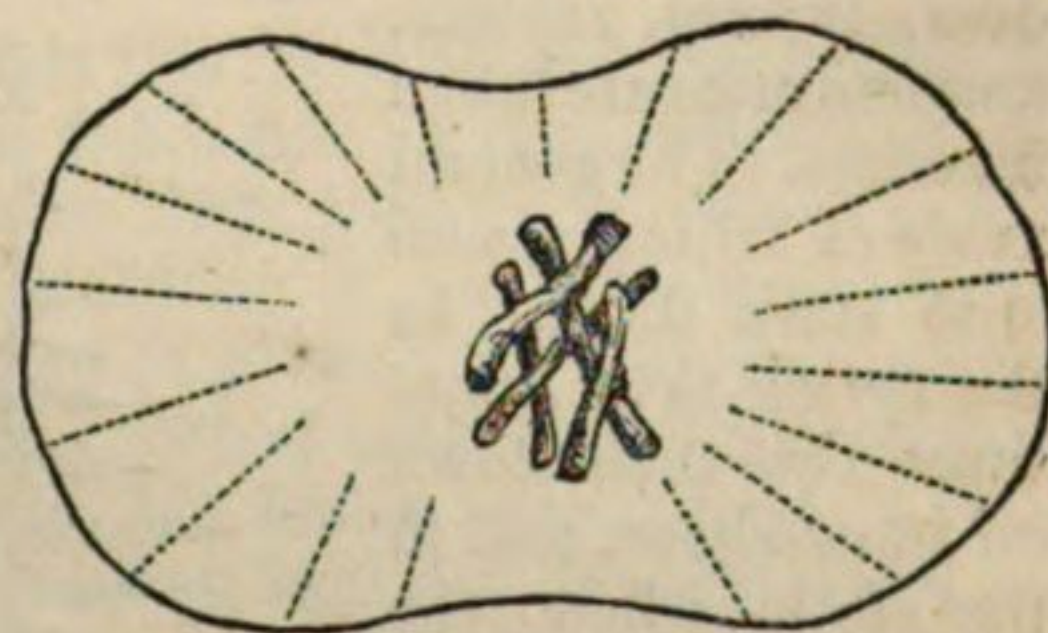
Kutchin, Nat-sit-Kutchin, this ornament consists of four Hiagua shells fastened together, but among the Hong-Kutchin and other tribes a metal ring is used sometimes instead. Making an incision in the under lip, or flattening the heads of infants, are quite unknown among them.

Food.—This consists for the most part of venison or fish, though they eat the mountain sheep and goat, rabbits, partridges, wild fowl, and, in the winter, bears. The bears are not often eaten in summer, as their flesh is not good at that time. The country is full of game of all kinds; moose abound in one part, deer in another.

Dwellings.—These are movable, and are thus constructed: deer skins are dressed with the hair on, and sewed together, forming two large rolls, which are stretched over a frame of bent poles. The lodge is nearly elliptical, about twelve or thirteen feet in diameter, and six feet high, very similar to a tea-cup turned bottom upwards. The door is about four feet high, and is simply a deer skin, fastened above and hanging down. The hole to allow the smoke to escape is about four feet in diameter. Snow is heaped up outside the edges of the lodge, and pine brush spread on the ground inside, the snow having been previously shovelled off with snow-shoes. The fire is made in the middle of the lodge, and one or more families, as the case may be, live on each side of the fire, every one having his or her own particular place.



Elevation of hut.



Ground plan of hut.

In travelling, the women haul the lodges, poles, rolls, blankets, kettles, &c., upon wooden trunnions, something similar to the American sleigh, only the runners are turned up behind as well as before, thus being equally fitted to move backwards or forwards. When the day's journey is finished, the men put up the lodges; but

when a lodge has to be removed only a few yards, the women do it.

When a number of lodges are placed together, no regular form of arrangement is observed, except that the doors are all turned one way, that is, to the leeward. They have no lodges or buildings set apart for public purposes, though they certainly have an enclosed place for medicine dances, feasts, &c., for the dead.



Kutchin sled.

Arts.—There is little to say upon this head. They have no pottery; and their only vessels were constructed of bark, wood, matting, or sheep horns. The birch bark vessels are usually square or oblong; wooden troughs are used as dishes, and wooden or horn spoons are large enough to hold a pint. They are never made so small as a table-spoon. The kettles were, and still are made, by the Hong-Kutchin at least, of tamarack roots woven together. These kettles are very neat; hair and dyed porcuquine quills are woven into them. The water is

boiled by means of stones heated red hot and thrown into the kettle. The arrow-heads are of bone for wild fowl, or bone tipped with iron for moose or deer; the bow is about five feet long, and that of the Hong-Kutchin is furnished with a small piece of wood, three inches long by one and a half broad and nearly one thick, which projects close to the part grasped by the hand. This piece catches the string and prevents it from striking the hand, for the bow is not bent much. There are no individuals whose trade it is to make spears, bows, or arrows. They make knives out of 8-inch or 10-inch files; these are long and narrow, pointed and double edged; one side has a ridge running from the handle to the point, the other side is slightly hollowed. The blade and handle are made of the same piece of steel, and that part grasped by the hand is covered

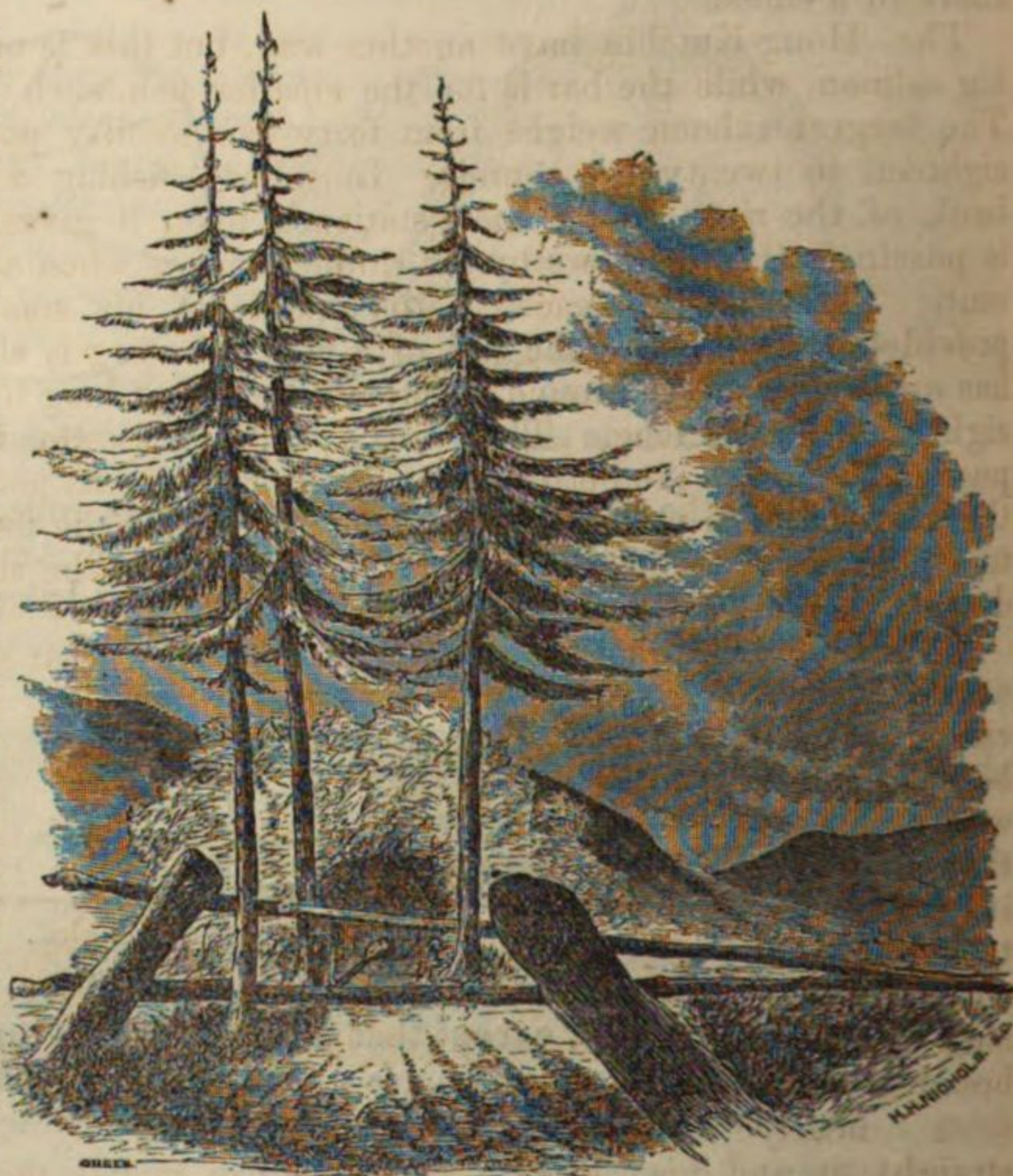
with dressed deer-skin, and the top of the handle is curved. They have no means of



Kutchin knife.

spinning. They weave kettles of tamarack roots, shirts of strips of rabbit-skin, and caps of the same material. For dyeing they use berries and a kind of grass growing in swamps. Foxes, martens, wolves, and wolverines are caught in traps; moose deer, lynxes, rabbits, and marmots are taken in snares. The general mode of killing moose is to stalk them. In the spring they sometimes run them down on snow-shoes, and in the fall, when the moose are rutting, the hunter provides himself with a shoulder blade of the same animal; he then approaches the male as close as possible, and rubs the bone against the trees. The moose charges at once, mistaking the sound for that made by another male rubbing his horns against the trees.

They sometimes surround an island where the moose are known to be, and kill them



Marten trap.

NOTE.—The marten trap is adjusted as shown in the figure. It consists of two long sticks of wood, the end of one held above the other by a short upright piece, the lower end of which rests on the end of a short horizontal twig carrying the bait. An enclosure of brush or twigs is built up behind the bait, so that the only access to it is between the logs. When the bait is touched the horizontal twig is disturbed, the upright is thrown down, and the upper stick falls, crushing the animal. The short logs laid over the stick serve to secure sufficient weight to kill the marten.

when they run out on the ice or plunge into the river, though this mode is very seldom used, the general way being to stalk them.

Deer are chased on snow-shoes, the hunter loading and firing as he runs. They also make deer pounds, and kill numbers of deer at a time in them, with snares, of which there are several hundred in one pound. When there are a large number of Indians together, they sometimes surround a herd of deer.



Fishing stage and basket.

They kill fish in bars, terminating in a basket, by the side of which is a stage upon which the fisherman stands. The bars and the basket are made of willows, bound together with babbiche, (deer parchment,) wetted and cut into lines, and then dried, and are fastened to poles driven into the bed of the river. The basket is nine or ten feet long, by about four broad; the mouth reaches to the bottom, and the other end floats on the top of the water. When the fish enter the

mouth of the basket they are immediately pushed to the upper end of it with scoops, made like rackets for playing tennis ball, and then killed with a blow of a stick. When the basket gets inconveniently full, the fish are carried to the shore in a canoe.

The Hong-Kutchin have another way, but this is only used for killing the big salmon, while the bar is for the smaller fish, such as pike, white fish, &c. The largest salmon weighs from forty-five to fifty pounds, the smaller from eighteen to twenty-five pounds. In salmon fishing a stage is erected on the bank of the river, and a man stationed upon it gives notice when a salmon is passing; this he knows by the ripple it makes when ascending the strong current. The other men, each in the middle of his small canoe, push out, all provided with a bag at the end of a pole; the bag is about five feet deep, and has an oblong frame around its mouth three feet long by one broad; the pole is eight or nine feet long. The Indian paddles his canoe in front of the fish, and pushes his net to the bottom right in front of it; as soon as the salmon enters the bag the man pulls it to the surface and stabs the fish with a knife fastened to a pole about five feet long; he then either lifts the salmon into his canoe, or drags it ashore in the net.

This mode of killing the salmon requires very great skill in the management of the small

canoe, as will be easily seen when I say that the canoe is flat-bottomed—is about nine feet long and one broad, and the sides nearly



Kutchin boat.

straight up and down like a wall. The fish makes the water foam when it is first hauled up; if it strikes the canoe it will knock a hole in it; if it goes under the canoe it will upset it; and as none of the Kutchin can swim, the consequences might be unpleasant.

The Taitsick-Kutchin make nets similar to ours in shape, constructed of willows instead of twine. The outer bark is scraped off, and the inner taken off and twisted into thread. The Youcon Indians do not make this kind of net,

nor do they know how. Their implements for fishing are the bag for salmon, the bar for the fish in the small rivers, a hook and a spear. They also make a small fish out of bone and hang it upon a line in the water; when the pike approach it they spear them. To make a spear a pole about nine feet long is taken, a spike driven into the end, on each side of which is a flexible piece of bone or wood, with a nail or sharp piece of bone attached to it, both pieces of bone pointing inwards and upwards. When

a fish is struck, the two jaws, if I may call them so, are forced open, and the spike driven into the back of the fish, and in jerking up the spear the two



Fish spear.

nails or pieces of bone in the jaws either stick fast in the sides of the fish or meet under its belly, thus preventing it from falling off the spike. The hooks are made and baited in the following manner: The pinion of a goose is taken, and the smaller bone is sharpened and fastened hook-shape to the larger; a piece of fish-skin is cut the shape of a fish and sewed on the hook; that part representing the head is at the point of the hook; that representing the tail is where the bones have crossed each other; a line is then knotted to the larger bone, and all is complete. Muskrats are taken in a scoop, after breaking the rat-house, and beaver with a gaff or net bag, after breaking into their houses, or shot swimming down the rivers.

There are several kinds of berries eaten here, principally the cranberry and a kind of blue berry. They also eat a kind of root; I do not know the botanical name for it, but it grows on sandy ground, is sweet, and when roasted tastes like parsnips.

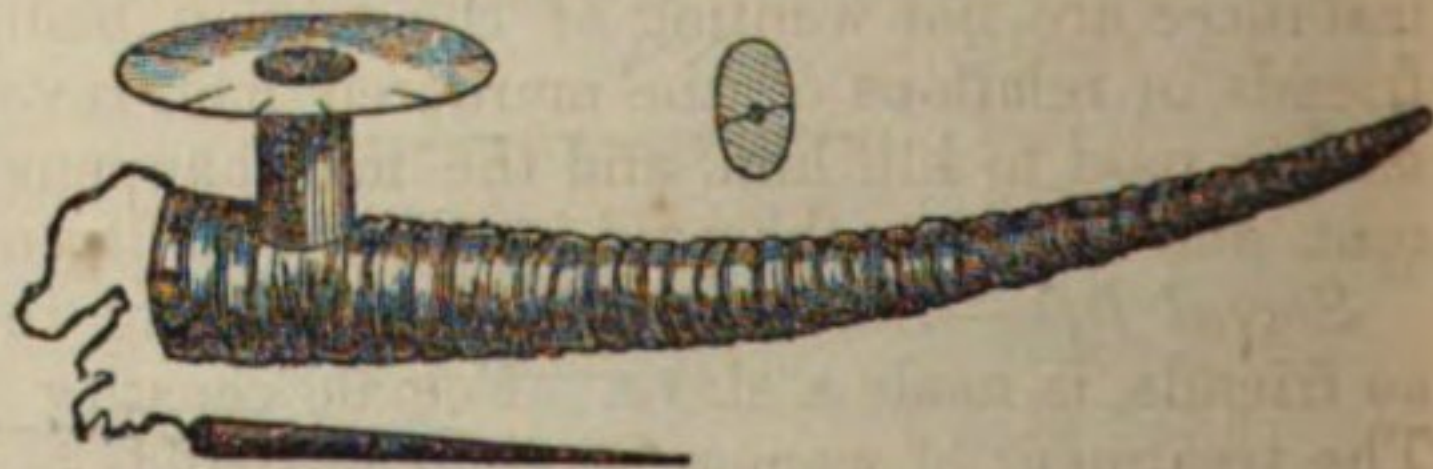
The Kutchin do not practice agriculture at all, and their only *domestic animals* are their dogs, miserable creatures no larger than foxes. They do not make any intoxicating drinks whatever, but are passionately fond of tobacco; this they of course learned from the whites. Most of the Kutchins smoke in the same manner that we do, but some of the tribes use the same pipe as the Esquimaux, and swallow the smoke. This kind of pipe has a wooden stem twelve inches long, slightly curved upwards; the bowl is well represented by the half of a reel for winding sewing cotton upon, and the hole in the pipe is about the same as that in the spool. A pipe is of this shape; the bowl is made of metal; they do not smoke pure tobacco in it, but mix it with scrapings of willow.



Baited fish hook.

The Kutchin still retain the bow, which is of the same shape, through all the tribes, with the

exception of the small guard in the Hong-Kutchin bow, mentioned before. The quiver is the same, and worn under the left arm; it is furnished with two small loops to hold the bow, thus leaving the hunter both hands free to use his gun. The arrows are placed in the quiver with the notch downwards. The Kutchin are not expert with the bow; no doubt they were better shots before fire-arms were introduced among them. The bow is made of willow, and will not send an arrow, with sufficient force to kill a deer, more than from fifty to sixty yards. The arrows are made of pine.



Pipe.

Trade.—The Kutcha-Kutchin, among whom the fort is built, are traders; they make very little for themselves, but buy from the other Indians; their

standard is called a naki eik, (bead clothing;) it consists of long strings of beads joined together at the distance of a foot; the lines are seven feet long. The whole naki eik is equal to twenty-four made beaver, and one of the lines is one or more beaver-skins, according to the value of the beads.

Before the arrival of the whites they had no religion, but they believed in a Supreme Being who would do good to them, but they knew of no evil spirit. One man told me that they had no devil at all before the whites came. They have many superstitions. For instance, when the fire made a hissing noise they threw in some fat, and asked to be able to kill some animal; if a crow passed they asked it for meat, and promised to share it with the crow. There are several rocks that they used to make offerings of beads to, in order that they might be able to kill some animal soon.

Medicine.—As they had no religion, so they had no priests, as with the southern Indians; nor had they any sacred fire. They had, however, magicians, who could do wonderful things. If you were to believe their own story, they could make wind, prophesy, and when a storm of rain was coming, by putting their medicine bag on a pole at the side of the lodge next to the storm, they could make the clouds turn and the rain fall in another place.

The medicine man, whose profession it is, or, rather, who professes to cure all diseases whenever he pleases, is rather an important man among them. His treatment consists of singing barbarous songs over the sick person and performing all kinds of antics; he is also a magician; in fact, there is little or no difference between them. They practice blood-letting also, *ad libitum*, and for every complaint, from a headache to a pain in the big toe. As for plants, they have no knowledge of them whatever, except one which they eat and another which is poison; this last is never used for any purpose.

Government.—They are governed by the same chiefs in peace and in war. The authority of a chief is very limited, for the Indians are very unruly, and not at all disposed to submit to authority. The chiefs are chosen either on account of their wisdom or courage, and not at all on account of birth. They have no insignia of office, and as for privileges they have all that they can take, and none that the others can withhold from them. The chiefs and old men are all who are entitled to speak in council, but any young man will not hesitate to get up and give his seniors the benefit of his wisdom.

Law.—They have no law; or, rather, the injured party takes the law in his own hand. For theft, little or no punishment is inflicted; for adultery, the woman only is punished, being beaten and sometimes thrown off by her husband, and instances are not wanting of the woman being put to death; for murder, the friends or relations of the murdered man revenge his death; but if a medicine man is paid to kill him, and the man happens to die, the medicine man is innocent, and the one who paid him is the guilty one.

Social life.—Slavery is practiced among them. Any poor creature who has no friends is made a slave. Female chastity is prized, but is nearly unknown. The treatment of women by their husbands is very bad; they are, in fact, little better than slaves. If a Kutchin is eating he does not allow his wife to eat with him, but after he is satisfied he throws her some meat just as he does to his dogs. She cuts and hauls his fire-wood; she hauls his lodge, kettles, and property when the camp is moved; she hauls the meat to the camp in winter and carries it in summer. During the warm weather she dries the meat, carries him water, makes his clothes, laces his snow-shoes, and, indeed, does all the drudgery of the camps; but in travelling the men do a little—just a little; they go before, making a track, and stop at such a place as they think the women will be able to reach about nightfall. They choose a level place just large enough for a lodge, scrape off the snow, line it with pine brush, cut some few armfuls of dry willows, and the women put up the lodge when they arrive.

The men always cook. If a wife will not obey her husband she gets a good beating. Children are generally well treated by their parents.

They have no regular festivals, but when a man of consequence dies his friends make a dance, as the whites call it, in his honor. A space some twenty yards square is railed in, a fire lighted in the middle, and various games are played, such as putting a pole across the fire, one party trying to push the other to one end of the enclosure, or one takes a dressed deer-skin and runs off with it; the fellow, if he is nearly caught, drops the skin, when another takes it and is chased by all the rest in his turn. At last the deer-skin is seized by as many as can find room to take hold; it is then cut up, each retaining the piece in his hand. Sometimes bladders of grease are used instead of deer-skin. Now and then they all gather in the enclosure, and, standing round the fence, sing mournful songs and make speeches. This continues for ten or twelve days, when the fence is thrown down, and the beads and other things provided by the person making the dance are divided, each person receiving a present in proportion to his rank; but this present is not entirely gratis, for some months afterwards the giver will come and say: "I gave you thirty 'made' beaver; pay me fifteen and keep fifteen;" which has to be done, of course. The same way when a person dies, if he is a great man among them. Four men make his grave, or, rather, either burn him or hang him up in a coffin. These four are paid as follows: The first gets thirty, and pays ten made beaver; the next twenty-five, and pays ten; the next fifteen, and pays five; the next twelve, and pays three. The coffin, when the body was to be buried that way, was supported upon a stage, with a knife, bow and arrows, a flint fastened to a stick, a stone to strike it on to make fire, and a piece of the fungus that grows on a birch tree for tinder, with some touch-wood also. The body was dressed in the best they had and painted, and was placed in the coffin with the various things mentioned above. The men who made the grave or buried the corpse lived apart for two moons. A man was put on the stage if he was well liked; and they used to burn them to keep the maggots from eating the corpse.

There is no ceremony observed at marriage or birth. A man will sometimes take a small girl ten or twelve years old for his wife; but this is merely a precaution to secure her, as she cannot live with him as a wife at that age. A man may take a wife of the same band to which he himself belongs; but if he take a wife from another tribe, the children belong to the tribe of their mother.

A woman must live apart from her husband during her monthly terms. They are in the same lodge, but a partition made of willow is between them. A young woman must live entirely apart in a separate lodge during her first two terms, or she will spoil the hunting of the men. All the Kutchin are divided into three castes, called, respectively, Tchit-che-ah, Tenge-rat-sey, and Nat-sah-i. It used to be customary for a man belonging to one of these castes to take a wife from one of the others, but this has fallen into disuse.

With the Kutchin the *father* takes his name from his *son* or *daughter*, not the son from his father, as with us. The father's name is formed by the addition of the word *tee* to the end of the son's name; for instance, Que-ech-et may have a son, and call him Sah-neu. The father is now called Sah-neu-tee, and his former name of Que-ech-et is forgotten. They sometimes change a woman's name from Toat-li to Sah-neu-behan, or Sah-neu's mother.

War.—The murderers—it would be ridiculous to call them warriors—array themselves in paint and put three eagle feathers in their hair. Before setting out they join in a dance similar to the one for the dead; but at the end of it the men get into a line on one side and the women on the other; the men then run at the women, the latter lie down, the men jump over them, and the man who falls will be killed in the fight. The dance over, the party set out, killing everything they meet—foxes, crows, and every living thing—so that it may not give notice of their approach. When they meet the enemy they pretend to be very

great friends. After some time—perhaps days after their arrival—they seize the opportunity when their hosts are off their guard and plunge their knives into their hearts. Their weapons were the bow, arrow and knife. They murdered men, women, and children, except such of the women as took the fancy of their brutal conquerors, whom they took and treated no worse than the women of their own tribe.

They have no knowledge of scalping, nor do they shave their heads.

The changes introduced among them by the whites are as follows :

There is far less murdering than in former times. The women do not kill their female infants. The young men do not strangle their parents when they are too old to be of service, and become a burden upon them.

They use the gun instead of the bow in hunting, and iron axes and knives instead of stone, and they treat their women better.

I forgot to mention in the proper place, that in war, when a man kills his enemy, he cuts all his joints.



Indian cradle.

THE AMERICAN MIGRATION.

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PREFACE.

THE following pages are occupied with a subject but little considered and, as far as I am aware, not yet specially treated of. Limited, however, as are the sources of our information respecting aboriginal American history, the present essay can prefer no claims to completeness in having exhausted the materials actually before me. But my fellow-laborers, of whom it is to be regretted there are but few in Germany, and scarcely any within a more immediate circle, will perhaps meet herein with some views not before promulgated. I have scrupulously endeavored to collate, as far as possible, whatever relates to the American migration and constitutes the sum of our present knowledge respecting it, and my aim will have been attained if I shall succeed in drawing the attention of the public to this wide and uncultivated field of the ancient history of America.

In order to facilitate the necessary preliminary studies of any one to whom this subject may offer serious attractions, I have not deemed it superfluous to supply in the notes an array of the most remarkable and important authorities which furnish the material to be employed in the elaboration of primeval American history, although it be necessary with this view to cite many works which have no direct bearing on the subject treated of. In each of the cited works there will at least be found some detached contribution to our knowledge of the migration in question; it was, in fact, from such notices that my own studies have been drawn, since, as above mentioned, there was no special treatise to which I could have recourse. Where occasion offered, I have compared with one another the phenomena of migration in both continents, even when no ulterior consequences were to be deduced; prompted in this by the reflection that it is always interesting to bring into juxtaposition the parallel incidents of history.

My point of view, which I have deemed it necessary to indicate in advance, is frankly opposed to that adopted by the greater number of inquirers in this and kindred provinces; the hypothesis of an immigration by which America was peopled finds able and influential supporters; the conception of an autochthonous population is shared only by the few. It will be understood that only extensive and analytical researches, lying beyond the scope of the present publication, can have forced upon me an opinion which I cannot alter until its untenableness shall have been clearly established.

Taking this opportunity to express my warmest thanks to the accomplished and friendly individuals, both far and near, who have in the most liberal manner promoted my studies, I commend the following pages to the indulgence of the learned and the kindness of the reader.

VIENNA, *February 6, 1866.*

As the geographical description of the theatre on which the most important human transactions have taken place supplies a peculiar value to the representations of the historian, and seems an almost indispensable background to the historical picture, so are isolated historical events of high interest to the geographer who undertakes to investigate and explain certain remarkable phenomena, especially in relation to the geography of races and languages. One of these events which enters most deeply into the geographical relations of the world, which offers accordingly a point of contact as well to the historian as the geographer, is incontestably that vast phenomenon of the migrations which are authentically recognized as having taken place in all parts of our earth.*

In the following pages it is the migration in America which is to be especially kept in view. Some brief preliminary remarks, however, seem to me indispensable in order to indicate the point of view from which the following studies were prosecuted. Although it cannot be denied that, in the earliest epochs, migrations of tribes everywhere took place, I am forced to dissent from the opinion so often revived in latter times, which supposes, for the sake of explaining all that is otherwise inexplicable, a general peregrination which is itself involved in the most mysterious obscurity. In assuming such migrations the utmost circumspection should be observed, and the assumption can only be vindicated when shown to rest on firm historical foundations. For this reason I am unable to give in my adhesion to the theory which assumes that the original seat of the human races must be sought in higher Asia or somewhere else,† whence mankind are supposed to have spread themselves gradually over the whole globe; an assumption which is contradicted, in the most decisive manner, by the peopling of the New World. It is impossible to enter here into all the hypotheses‡ which have been framed for the explanation of a fact so perplexing to the biblical students of the sixteenth century, and of course later times; it is enough to say that thus far not one of them has been found to correspond

* We know that even the South Sea islanders migrate. See on this subject: Dummores-Lang; *View of the Origin and Migrations of Polynesian Nations*.—Quaterlages: *Les Polynesiens et leur migrations* (*Revue des Deux Mondes*, Feb. 1864.)—O. F. Peschel: *Die Wanderungen der Südsee-Völker* (*Ausland*, 1864.)

† Galindo, for example, transfers the original residence of the human race to America, and supposes civilization to have thence migrated into the Old World.

‡ I content myself with mentioning, besides the writings of Delafield, J. McIntosh, Bradford, Zestermann, Castaing, Feyjoo, J. Perez, Mitchell and the Abbé Brasseur de Bourbourg, the following interesting and rarely cited works, for which I am, for the most part, indebted to the kindness of Hr. George Schwarz of Vienna, who has allowed me to make unrestricted use of his rich collection of books relating to America: Hugo Grotius: *Dissertatio de origine gentium Americanorum*, Amstelodami, 1642.—Jean de Laet; *Notæ ad diss. H. Grotii de origine gent. Americ.*, 1643.—Jean de Laet: *Responsis ad H. Grotii diss. de origine gent. Americ.*, 1644.—Poisson: *Animadversiones in originem Peruvianorum et Mexicanorum*, Parisiis, 1644.—Georgius Hornius: *De Originibus Americanis*, Hagæ, 1652.—Gottfried Wagner: *De Originibus Amer. Dissertatio* Lipsiæ, 1669.—Thom. Thorowgood: *Jews in America, or probabilities that the Americans are of that race*, London, 1650.—And Rocha: *Tratado unico y singular del origen de los Indios occidentales del Perú, Mexico, Santa Fé, y Chile*, Lima, 1681.—Engel: *Essai sur cette question: comment l'Amerique est-elle etc peuplée d'hommes et d'animaux*, Amsterdam, 1767.—*Philosophische Untersuchungen uber die Amerikaner*, Berlin, 1769.—Corn. de Pauw; *Recherches sur l'Amerique et les Americains*, Berlin, 1774.—Vater: *Untersuchungen uber America's Bevolkerung aus dem alten Continent*, Leipzig, 1810.—McCulloch: *Researches philos. and antiquarian concerning the aboriginal history of America*, Baltimore, 1829.—Josiah Priest: *American Antiquities*, Albany, 1834.

even approximately to the demands of science; and that theory is probably, in every point of view, the most tenable and exact which assumes that man, like the plant, a mundane being, made his appearance generally upon earth when our planet had reached that stage of its development which unites in itself the conditions of man's existence. In conformity with this view I regard the American as an autochthon; consequently there can no question be here entertained respecting an immigration into America.

The idea of the migration of American tribes is, for the most part, and by early writers nearly always, confounded with this immigration into America. While the American continent exhibits monuments, not to be mistaken, of a migration of the native tribes within the same, the idea of a foreign intrusion has been strongly sustained for three hundred years, during which these monuments have received a false interpretation. On the other hand, the surprisingly high culture witnessed by the first European visitors in a part of the world assumed to be inhabited by savages remained so inexplicable, and the knowledge at that time of the degree of civilization existing among the further Asiatic nations was so limited, that recourse was had to hypotheses which later inquiry has by no means tended to substantiate. Only in the most recent times and with difficulty has some progress been made in favor of the opinion which regards the American autochthons as a people who had attained a form of civilization by modes of their own, a conclusion which enriches the philosophy of history with a fact of no inconsiderable import.

Were we disposed to reduce into one comprehensive system all the fallacious hypotheses advanced, and which would, in fact, scarcely exclude any nation from the honor of having peopled, or at least civilized, America, we should find that they fall into two categories, which were only too often advocated by one and the same author, thus introducing into the question a truly embarrassing complexity. To the first category belong those hypotheses according to which America remained unoccupied and waste until, in process of time, some immigration, no matter on which side, took place from the Old World; a consequence, perhaps, of the general movement by which men separated themselves more and more widely from their original abode in Central Asia. This is the theory of a simply *populating immigration*. To the second category pertain those opinions which, in order to account for the singular degree of culture in America, suppose an immigration, no matter again on which side, of a people already civilized, though in times, of course, considerably nearer to our own. This immigration is also regarded by many as the occasion of the actual and acknowledged American migration; a view which obtained especial credit from the partial acquiescence of A. von Humboldt, who, indeed, avowed that he considered an ancient intercourse between western America and eastern Asia as more than probable, though he could not determine the manner in which the connexion of these Asiatic branches of the human family took place.* As distinguished from the first, I would call this last the theory of a *civilizing immigration*. But this, also, receives no countenance from the results of the latest investigations.

Freed from all these theories of immigration of whatever name, it remains to contemplate the migration of the American indigenes as an historical phenomenon, which stands alone and independent, like those observed in the Old World, with which we have, of course, far better means of being acquainted. To ascertain the causes of these, as well as of the migration of populations beyond the ocean, is a hitherto unachieved task; everything in relation thereto is mere conjecture. Whoever, like myself, entertains the persuasion that man in his development, and hence, indirectly in his history, is potentially influenced by

* *Ueber Steppen und Wüsten*, in the *Ansichten der Natur*, Stuttgart, 1859, vol. I, p. 151. See, also, numerous passages of Humboldt's masterly but little read work, *Vues des Cordillères et Monumens des Peuples Indigènes de l'Amérique*, Paris, 1816, vol. II.

the geographical conditions of the soil which he inhabits, and therefore stands in a much more dependent relation to its nature than is commonly supposed, may advance the indeed sufficiently hazardous hypothesis that this secret cause is to be sought in some natural phenomenon to us unknown; yet, to this supposition can no other than an entirely problematical value be attached.

If we seek, however, to establish for historical events a basis in geographical relations—that is to say, if we carefully compare them together, analyzing the former and investigating their possible causes, studying the latter and deducing as far as possible the resulting consequences—we shall find that certain generally valid laws, which resolve in the simplest manner many an unexplained riddle, are evolved from such a study through the remarkable correspondence of facts. Thus, in reference to the migrations of mankind, it seems to result from the geographical structure of continents that, as by virtue of an *historical law*, we are not to look for men of comprehensive and deeply penetrating intellect in Lapland or Malta, in Bosnia or Asturias; so, conformably with a strict *geographical law*, the *direction of the migratory stream will be found always to lie in the axis of the greatest longitudinal extension of the continent*.* In fact no example from history informs us that the Tchapogires, Tunguses, Jakoots, or people from the banks of the Amour have ever descended into the Deccan or Malacca; that the Ethiopians have ever migrated into Senegambia, or the Finns into Greece. As a new proof how much nations and men depend on geographical circumstances, and even when they believe themselves guided by their own will, merely obey a great natural law, the fact is of much significance that the American tribes form no exception to this general rule, for here, also, the procession of the migratory races is in the longer axis of the continent, namely, from north to south. This implies, of course, no mathematically exact line of transit, which, in America, apart from all collateral circumstances, would be simply impossible, from the fact that the southern part of the continent projects considerably further to the east than the northern. By a progress from north to south we understand no more than that the migrating tribes always tended towards more southerly regions.

That America, as well as Europe and Asia, was already inhabited before this great migration, and in many parts was possessed of an ancient civilization, admits of no doubt. Occasional traditions of those early periods of culture have penetrated to us, and I cannot forbear soliciting the attention of the learned world to this legendary cycle of America, which is certainly worthy, in every respect, of a critical scrutiny; for to judge from so much as is yet known, the inquiry cannot but yield interesting and valuable disclosures respecting the cosmogonic views of the American aborigines and the general tendency of their ideas; perhaps endow even the historian here and there with a fact of value.† But to determine, from our present knowledge of the mystical traditions of these races, which of the tribes in America may have been the oldest, seems to me as impossible as superfluous. Upon this soil multitudes of nations have moved

* I first advanced this proposition in the session of the Imperial Geographical Society, at Vienna, 14th March, 1865.

† It is wholly impossible, within the compass of this work, to enter into details or recur to all the sources which it has been necessary for me to take advantage of. I think it proper, however, in the interest of this in general but little cultivated study of the past ages of America, to name, from time to time, a part, if but a small one, of the principal works from which further information may be derived, and on which the views here developed are founded. With regard to legends and myths, see A. Rossæus: *Der gantren Welt Religionen, oder Beschreibung aller Gottes, und Goetrendiensta in Asia, America, und Europa*, Amsteldamie, 1667—Ternaux Compans: *Essai sur la Theogonie Mexicaine*, Paris, 1840, (Annal. des Voyages.)—Carl Rafn: *Cabinettet for Americanske Oldsager*, (Antiquarisk Tidskrift, Kiøbenhavn, 1852-54.)—J. G. Müller: *Geschichte der Americanischen Urreligionen*, Basel, 1855.—Brasseur de Bourbourg: *Popol Vuh, la livre sacré et les Mythes de l'Antiquité Mexicaine*, Paris, 1861.

and have sunk into the night of oblivion without leaving a trace of their existence; without a memorial through which we might have at least learned their names. Those nations only, which, by tradition, written records, monuments, or whatever other means first guaranteed the remembrance of their own existence, belong to the domain of history, and history which, to be true, accepts nothing but what is actually known, points to those as the primitive races which first transmitted a knowledge of themselves; time begins for us where the chronology of such nations takes its rise. But all these so-called aborigines might be only the remainder of previously existing races, of whom, again, we know not whether they were indeed the first occupants of the land.* In truth, we meet in America, at more than one point, with traces of a rich civilization, proceeding demonstratively from much earlier epochs than the tribal migration itself; as, for example, in upper Peru the gorgeous structures of the Aymaras, near Tiahuanuco, on the beautiful shores of Lake Titicaca; the mysterious monuments of Central America, between Chiapas and Yucatan, of which the buildings of Palenque constitute the most celebrated representative; the earth and stone works of a people distinct from the above, on the banks of the Mississippi and Ohio.

These facts, however, should not surprise us. We need only cast a glance at Europe itself. We know that the migration in middle Europe encountered races which had been preceded by the powerful Celts, a people widely spread, and endowed with a certain degree of culture, yet destined almost wholly to disappear, except at a few points whither the stream of migration failed to penetrate. But those great stone monuments which we find scattered from the most northern districts of Scotland to Portugal, from Courland to the western parts of France, and which, under various denominations, according to their form, are known as dolmens, menhirs, cromlechs, cairns, and giants' graves, whose occurrence in Africa has been recently demonstrated, and is asserted as regards even Syria and the Deccan. These all point to a still older pre-Celtish people, who, less cultivated than the preceding Celts, remain to us as great a mystery as the "mound-builders" of the Mississippi. The Celts, on their part also, wandered out of Asia into Europe, and probably met with these dolmen-builders, respecting whom we are at a loss to know whether they are to be referred to the Danish *kiökkenmöddings* and the Swiss pile-buildings, or whether these most ancient memorials of human society belonged to a still older people.†

These obscure periods of man's history in the old world have, as is well known, been distributed by European archeologists, in conformity with the most important remains of their industry, into the epochs of stone, of bronze, and of iron. Since heaps of shells, like those of the Danish coast, are found on the seashore in Newfoundland, at St. Simon's island on the coast of Georgia, and recently near Guayaquil in Equador, it is not without just grounds inferred that the same gradations of development which have given names to the above epochs will be also recognized among the aboriginal Americans. The duration of these periods would of course be very different, and their termination and commencement, respectively, be later than was the case in Europe. In Asia, undoubtedly, at least among some nations, the bronze epoch was preceded by a period of copper, which seems to have been wanting in Europe. The admirable

* Manuel Orozco y Berra: *Geografia de las Lenguas y Carta Étnografica de Mexico*, Mexico, 1865. I call the attention of all the friends of linguistic science to this elaborate and most meritorious work of my colleague, and add, that for the investigator of American history it is quite indispensable.

† Upon this interesting subject, which has in late times given rise to renewed discussion, recourse may be had to the suggestive writings of the Swedish naturalist, E. Desor, in the *Augsburg and Cologne Gazettes*, 1865, wherein he propounds his well-known Tamhu theory, which supposes the dolmens to have been the work, not of the Celts, but of the Tamhu tribes of Africa. Opposed to this are the opinions of my esteemed friend, Dr. Carl Andree, of Bremen, which he has communicated to the public through the *Globus*, edited by himself, and which present views worthy of the highest consideration.

researches of Squier and Davis* regarding the remarkable antiquities of the valley of the Mississippi have disclosed in America a civilization which preceded the bronze era, and was marked by the use of a pure red copper, which was hammered in a cold state, and whose sources are to be sought on Lake Superior, where it still occurs in large quantities. When this American age of copper existed, is not now to be determined; we only know that it must at least reach back to a thousand years, since such a period would certainly be requisite for the growth of the venerable forests which now cover the remains of that ancient civilization.† The end of the bronze age, on the other hand, may be determined through the beginning of that of iron, which made its appearance with the first settlement of Europeans in America, and is characteristic of the existing era of civilization.

The question might here suggest itself, in view of the existence of a considerable degree of culture in America before the migration, whether, in general, tribes in a state of civilization readily accommodate themselves to a migratory condition. If this question cannot be unconditionally answered in the affirmative, it cannot still be wholly negative, for experience has taught us that tribes who address themselves to migration, as, for instance, the above-mentioned Celts of Europe, always possess a certain if not very high degree of civilization; at all events, if not actually civilized, they are susceptible of becoming so. Even those hordes which, in the dawn of the middle age, overran Europe and overthrew Rome, the Goths, Vandals, Heruli, and Huns, were by no means devoid of all culture, possessing, as they did, even more of it than the races which they found and subjugated in Germany and Gaul. For these countries the migration was no retrogradation; neither had that of the Celts been so, who had previously wandered out of Asia. That a people in the full enjoyment of civilization, with political institutions, and the manifold resources of social life amply developed, should deliberately quit their abode in obedience to some inexplicable impulse of migration, calls for no long discussion. In single individuals—in numbers, indeed, of single individuals—the migratory impulse, through social, political, or other motives, may still be awakened, as we witness constantly in the case of European emigration. But whole races of men never set themselves in motion when they have once transcended a certain limit of civilization. It is, perhaps, not superfluous to observe that, if we speak here of an advanced civilization in ancient America, the phrase is by no means to be taken in an European sense. The sumptuous structures of Chichen-Itza and Palenqué sustain no comparison with the simplest monuments of Greek and Roman cultivation. The American drawings and sculptures are very far from indicating any truly artistic insight, while to any further advances in civilization in an European sense, the total absence of phonetic writing,‡ familiar as this was to the

* *Ancient Monuments of the Mississippi Valley*, (Smithsonian Contributions to Knowledge, vol. i: Washington, 1848, 4^{to}.) The antiquities of this valley constitute already a considerable body of literature, which, for want of space, I cannot here further discriminate. Suffice it to say, that the work just cited is the most complete of those now existing.

† See upon this subject the views developed in the "Natur," by the learned Dr. Otto Ule, of Halle. (*Blicke in die vorgeschichtliche Zeit des Menschen*, 1865.)

‡ Several nations of America were possessed of written hieroglyphical signs, but it was in Mexico that these had been most cultivated, and indeed the Mexican historical inquirer, Abbé Brasseur de Bourbourg, believes in the existence of a sort of phonetic writing. But a correspondence which I have held on this subject with the distinguished linguist, Don Francisco Pimentel, Count of Heras, has not resulted in a confirmation of this assertion. Don Pimentel writes to me, 21st September, 1865: "I have yet seen nothing to convince me that the ancient Americans had written characters like ours, although M. Brasseur is of a different opinion. They appear to have had only a *representative* and a *symbolical* mode of writing: the first a mere copy of the objects; the second expressive of ideas which admit of no material representation, as by placing a serpent to express *ime*. Something phonetic has been surmised in the characters employed to convey the pronunciation of the names of places and other proper names, but in my view this proves nothing, because all these names are significant, and might very well be expressed in a direct manner."

Assyrians, Persians, and Indo-Bactrians, nations which stood otherwise at a similar grade of development, must have operated as an effectual obstruction. Abstracted, however, from all purely cis-atlantic modes of thinking, the culture originally found in America must appear so much the more advanced as we compare it with the grade of development of other people in a state of nature—with that of the present Indians of America, for instance. This is the criterion which should be applied to all relating to the ancient civilization of America, and we shall thus be always justified in speaking of it as surprising in its advancement.

The people who, in due course of time, set themselves in motion in America, and sought new abodes in a southern direction, had not attained the degree of civilization which the Spanish conquerors marvelled at in the red men who inhabited the land at the epoch of their arrival, and which, notwithstanding, as above stated, fell far behind the ideas of European civilization even then entertained. I hold it, therefore, as by no means improbable that races, susceptible of improvement and bearing with them the germ of development, did really take part in the great American migration, but must decidedly regard it as an error to believe, as the advocates of the theory of a civilizing immigration do, that civilization was introduced into America simultaneously with the migration. That the course of civilization could not be wholly independent thereof is readily conceived. The event is considerable enough to have exerted in America, as in Asia and Europe, an influence on the development of civilization, the advanced condition of which, however, is very far from being identical with that of the migration.

To one who contemplates the features of the migration which in our older continent swept like a lava stream, in the fourth and fifth centuries, over Asia and Europe, hurling to the dust the decayed fabric of Roman domination, the migration of America must, in its whole form and nature, appear highly surprising. Here we deal not, as in Europe, with the relatively short period of some century, during which the different races, rapidly following one another, crowded together upon the same theatre, but, rather, a slow and perhaps intermitting progression, which required for its complete accomplishment a period of at least five or six hundred years. Modern inquiry, to be sure, has taught us that in further Eastern Asia, and many centuries before our chronological era, the stream of migratory tribes set itself in motion, and the attack of the Turkish race of Hiong-Nu on the Usün, a fair, blue-eyed, perhaps Indo-Germanic people, was the first check to the general movement which propagated itself from the great Chinese wall to the west of Europe. So far, certainly, is a similitude established between the migrations of the two continents, since to a certain point the advance of the Asiatic hordes was very slow, and only in the end, on its arrival at the boundaries of Europe, did it become a precipitate one. But in America it would be unquestionably more correct to consider the migration of tribes as a *shifting* of place, for it bore throughout this character. The circumstance that the American movement began about the time when the Asiatic-European ended, has led many to infer that it was the latter, which was simply continued into America, and of course coincides with the immigration theory which I have before more particularly spoken of.*

* The total unacquaintance with a milk diet in the new continent, and the consequent absence of pastoral pursuits, which forms in the Old World the transition between the nomadic hunting tribes and the agricultural populations, (certainly a striking phenomenon,) induced Humboldt to derive the supposed immigrants from those races of Northeastern Asia, of whom we know that the use of milk is to them equally a stranger. (Ans. der Nat., I, 52, and Vues des Cord., I, 34.) It further follows that he who admits the emigration to have proceeded from the northern regions of America, where climatic influences forbid the rearing of herds, will arrive at the perhaps more correct conclusion that a diet of milk was unknown to the Americans *a priori*. Were this not so, the immigrating tribes would very soon have learned from the original inhabitants the use of milk as well as of the farinaceous gramineæ.

The wide region east of the ranges of the great Rocky and Cascade mountains, and west of the Alleghanies, traversed by the mighty waters of the Mississippi, Missouri, Ohio, and their tributaries, this region, the proper home of the mound-builders, preserves no trace whatever of an immigration or emigration. The smooth prairie, belonging to a lacustrine formation,† embosoms only those enigmatical hillocks of earth which remain as yet the sole monuments of a widespread but vanished people. Nevertheless, it is more than probable that from hence the first emigrants moved towards the south. These lake regions, in their southern part, reach the latitude of 42° north, and according to Humboldt, the mysterious Aztlan, whence tradition alleges the Aztec races to have issued,‡ is not to be sought further south than the same latitude. In still higher latitudes appears the Esquimaux with his *karalit* language, wholly distinct from the rest of the American idioms, as his physical structure also varies from that of the other American autochthones, whence the Esquimaux is properly to be identified with the polar man, the original and peculiar occupant of the arctic circum-polar regions of all parts of the world.* It may be assumed, therefore, with reasonable probability, that the region from which the migration proceeded is to be found between the limits of the *karalit* dialect on the north and the 42° of north latitude on the south. Without deducing consequences from this, I must yet signalize the singular fact that the tract of Asia in which lies the probable point of exit of the migration of the old continent, between the great wall, namely, on the south, and the Amour river on the north, falls with nearly mathematical exactness under the same geographical degrees of latitude (the southern boundary coincides within $30'$) and the same climatic conditions as that of America. May there not be herein some circumstantial confirmation of my above proposed theory respecting the original causes of the respective migrations?

Although in the luxuriant pastures of this region no traces of the path followed remain, yet I am of opinion that observation of the geographical conditions of the land may guide us to a knowledge of its course. It may be assumed with certainty that such a migration always follows the most commodious conformations of the country, avoiding all obstacles which would oppose themselves to the easy transit of the great human multitude. Thus we see in Europe the advancing hordes first sweep unimpeded over the level steppes and gentle slopes of Sarmatia, then appear on the Danube, and, following the valley of that stream as the easiest route, penetrate into the heart of middle Europe and to the gates of Italy. In fact, the earlier Celts had before chosen this commodious road for their migration. If, then, it is permitted us to conclude from analogy, which is no uncertain guide when like causes operate under like conditions, the populations of the copper age of America, which had already dawned in the region of the lakes, would have followed the valleys of the Ohio and Mississippi, and then have directed their steps through the present States of Louisiana and Texas, probably along the edge of the gentle acclivity which, under the name of the Sierra Guadalupe, stretches from the Rio Grande to the Rio Brazos, towards the banks of the great Rio Grande del Norte.

There are many indications, moreover, which lead us to believe that this was not the only route by which the northern tribes made their way to the south. A part of them seem to have become detached in the Mississippi valley, and to have projected themselves towards the southeast into Florida, the seat of a higher civilization, whence they eventually proceeded to Cuba and Yucatan;

† According to the researches of Professor Alex. Winchell, (*Silliman's American Journal of Science and Arts*, November, 1864, No. 114.)

‡ See, as regards this, Humboldt, *Vues des Cordillères* in different places.

* M. Cl. Markham, secretary of the Geographical Society of London, delivered, 27th February, 1865, a discourse "on the origin and migrations of the Greenland Esquimaux," in which he supposes them to have proceeded from Upper Asia! So I have read, at least, in an account of the discourse, the original of which I have not been able to see.

while a branch of them, traversing the whole length of Cuba and the great arch of the Caribbean islands, descended finally to the banks of the Oronoco. This fraction of the migratory population may, of course, have been small and its impetus inconsiderable, since the necessity of maritime transport, though only from island to island, would naturally impair its force. In the opinion of others, and among them Humboldt, even the Rocky mountains in their extension northward may have led similar branches of emigrants to adopt a different path in their progress towards the south. Whether these branches originally issued from the lake regions, though it is not impossible, is difficult to determine. They must at any rate, in departing from their homes, have taken a directly west or at least southwest direction. Although no substantial reasons can be assigned why any race of those latitudes should have given a preference to the toilsome defiles of the Rocky mountains, when the fair and commodious plains and prairies of the south lay before them, yet too many points of apparent connexion present themselves to admit of our consigning their adoption of such a route to the category of impossibilities.

It is from the Rio Gila onwards that we are first enabled to perceive definite traces of the course of the migration into the regions of the south; the indications of the different stages of its progress increase with its entrance upon Mexican territory, but we yet possess only sparingly the means of identification. The first immigrants who appeared in the north of Mexico brought with them the so-called Toltecatl civilization, the work of the races of the great Nahoia family.* The space which this mode of culture gradually occupied is shown by the two great *casas* on the Rio Gila† and in Chihuahua, by el Zape in Durango and la Quemada in Zacatecas. Whether all these tribes maintained at the same time a separate or subordinate condition cannot now be ascertained; but in proportion to the genera growth and improvement would be the provection of their boundaries to the south and the inducements offered to further migrations.‡

By the term immigration of a race we are not generally to understand a single immigration only; we should rather comprehend under the common name, for example, of the Nahoia immigration, all expeditions of the branches belonging to that family. These expeditions took place successively at intervals, and therefore, from first to last, suppose a considerable length of time, within which a large number of these branches successively arrived on the banks of the Rio Grande and Rio Gila. This consideration is of the more weight, since, through an improper conception of such terms, which involve, as we see, an idea of multitude, a source of confusion is introduced into the already sufficiently obscure history of the American migration.

Over the Nahoias floats still much mystical obscurity; the epoch of their appearance in the northern parts of Mexico admits as yet of no accurate determination; it must have taken place, however, at a much earlier time than the commencement of our Christian era. Our knowledge respecting these partially mythical people amounts to little more than enough to justify us in regarding them as perhaps the founders of the stone-works in northern Mexico. If we admit that the age of the civilization indicated in the region of the Mississippi reaches back 2,000 years, it is not impossible that the Nahoias were also the builders of the earth-mounds in North America, or at least belonged to the race from which these works proceeded. As regards the stone structures of the

* The first volume of the Abbe Brasseur de Bourbourg's *Histoire des Nations Civilisées du Mexique et de l'Amérique Centrale*, (Paris 1857-'59, 4 vols.,) treats at length of the Nahoias. This work is very full and authoritative, though scarcely written with all the discrimination and clearness which was desirable.

† At the confluence of the Rio San Pedro with the Rio Gila, which is itself an affluent of the Rio Colorado, emptying into the Gulf of California, (Mar Vermeio.)

‡ Orozco y Berra; *Geogr. d. las leng. de Mexico*, p. 125.

great *casas* of el Zape and la Quemada, we cannot but infer that their builders must have been long permanently settled in those districts, which accords much better with later researches than the assumption of many that the immigrating tribes had merely halted in the places for a few years, perhaps a quarter of a century, and in that time had erected these monuments.*

With the appearance of the Toltecs some light begins to dawn on the history of the migration.† This cultivated people, kindred also to the Naho family, entered Mexico in the seventh century of our era. The year 648 is generally reckoned that of their appearance; only Clavigero carries it back to the year 596. But here, likewise, is to be understood not merely a single immigration, but several of the same family. This plurality of migrations presents no light difficulties to the historian as well as the geographer. Orozco y Berra, whose linguistic and historical labors merit our highest consideration, has exerted himself to throw some light on the perplexities of the Toltec immigration. In the hieroglyphic annals relating to this subject we find the record of several itineraries, which all adapt themselves to the immigration in question. These itineraries, partially provided with chronological notices, correspond in some points, but disagree in others, and thus prove that they do not belong to one and the same expedition. It has already been shown that the routes of such migrations are always essentially influenced by the geographical conformation of the country.‡ Hence, at least three different routes of immigration are distinguishable on Mexican soil. The first and most important lies in the western part of the country, and may be traced from Sinaloa to Nicaragua along the coast of the Pacific ocean. The mountain chain which separates Sinaloa from Durango, and stretches to the banks of the Rio Tololotlan, marks the direction of this route for many leagues. First, the course of the Rio Grande de Santiago,§ then that of the Zacatula,|| diverted a part of the wanderers from the direct route and led them to the lake of Chapala,¶ where they established themselves, while others, following in like manner the valleys of water-courses advanced to Guerrero, and gradually made their progress to the fertile table land of Cuernavaca,** and still later to Puebla and Tlaxcalla.††

The monuments of both the grand *casas*, el Zape and la Quemada, plainly show the second and middle route which led, on the east of the above-mentioned mountain chain, directly through Chihuahua, Durango and Zacatecas, to Jalisco,

* I had myself long held this opinion till a closer consideration of the facts satisfied me that the space of a quarter of a century could not have sufficed for the erection of monuments which are in fact the scanty remains of extensive settlements, probably of whole cities. It is hardly consistent with the logic of migration that a people in such circumstances should find it expedient to found cities, only to abandon them in so short a time.

† The populations which were settled in Mexico before the arrival of the Toltecs might also be possessed of an ancient native civilization; among these pre-Toltec races are to be numbered the Olmecs, the Otomi, whose monosyllabic speech forms an exception to the polysynthetic idioms of America, the Totonacks on the eastern terraces of the Cordilleras, the Mixtecs on the coast of the Pacific ocean, the Tarasks in the greater part of Michoacan, and the Zapotecs in Oaxaca.

‡ Mountain ranges, river courses and sea-coasts prescribe limitations; while for half civilized, pastoral and agricultural tribes, the fertility, streams, lakes, and dales of new countries offer special attractions.

§ This river, called also the Tololotlan, which is formed at Salamanca by the junction of the Rio Hondo de Lerma and the Rio Laxa, flows through the lake of Chapala and empties into the Pacific ocean.

|| The same name was borne by a city at the mouth of the Rio de las Balzas, on the Pacific, which was long the capital of a flourishing and to the end of the fifteenth century independent state.

¶ The lake of Chapala is the most considerable of those of the whole elevated plateau, and is distant forty miles in a northwestwardly direction from the capital.

** The ancient Quahnahuac.

†† Tlaxcalla was once called Chalchinhapan; also Texcalticpac, (i. e., end of the stone houses,) still later Texcallan, (Rock city,) and finally Tlaxcallan, (Breadland, from Tlaxcall—maize-bread,) on account of the fruitfulness of its situation.

on the shore of lake Chapala, whence the immigrants would easily attain the Mexican table land.

On the east we discern along the Rio Grande del Norte the traces of a third route of immigration which, according to Orozco, seems not to have touched upon New Leon and Tamaulipas. Whether the widely strewn ruins of an ancient city on the banks of the Rio Panuco* in the territory of the warlike Huastecs,† are associated with this route, I am not able to determine. Further to the south the traces again come to view, and may be followed to their junction with the rest on the high lands of Anahuac.

From these facts it results, in conformity with the accurate indications of Orozco, that, while heretofore but one Toltec immigration into Mexico has been admitted, several have in reality taken place at different times and by different lines of advance. To determine how many there may have been is at present impossible. It is certain, however, that through the supposition of a single immigration of a single migratory race it has been necessary to reconcile expeditions, facts, and discoveries, with unconformable names, with incoherent and contradictory conclusions, with a chronology in the highest degree perplexed, resulting, of course, in the most inextricable confusion. When we come, on the other hand, to analyze the phenomena so as to refer them to the facts as they really occurred, the difficulties vanish, riddles are solved, and all falls into the natural order, which from the first should never have been lost sight of.

After it had lasted four centuries, famine, pestilence, and civil war put an end, about the year 1018, to the Toltec monarchy in Mexico.‡ The larger remnant of those Toltecs who had been spared by the calamities of the times left their country, and, according to the historian Don Fernando d'Alvarado Ixtlilxochitl, took refuge in southern Guatemala and Nicaragua, but few families remaining in their desolated land. Soon thereafter, but in the opinion of others a century later, the barbarous Chichimecs made their appearance on the high lands of Anahuac. Just as the Toltecs had occupied the sites in northern Mexico, abandoned by the Nahoas, in their progress southward, so had the Chichimecs who followed been long established upon the deserted lands of the Toltecs after the withdrawal of the latter to Anahuac. When now again the Toltecs abandoned the land which they had inhabited for four hundred years, the Chichimecs still followed at their heels; nor was it necessary that they should enter as conquerors, since it needed only to take possession of the deserted homes of the Toltecs. These Chichimecs in the mean time, who had so long lived adjacent to the Toltecs, had, through their intercourse with the latter, in some degree discarded the rudeness of their manners at the date of their appearance on the elevated plateau of Mexico; as had been the case with the barbarians who overthrew Rome, but at the same time imbibed the culture of the civilized Romans.

The races which had thus far appeared in Mexico had pertained to one great branch of languages, the Nahoas, a dialect of which was also spoken by the Toltecs; and this, till very recently, was supposed to have been the case likewise with the Chichimecs, although the Mexican historians Ixtlilxochitl and Torquemada

* *Americanische Alterthümer*, (Westland, edited by Dr. C. Andree, Bremen, 1851, vol. i. p. 129-139,) a very interesting article.

† They inhabit the district known by the name of Huasteca in the north of Mexico, and, on the Gulf from Tuxpan to Tampico, a tract which embraces the northern part of the State of Vera Cruz and a part of San Luis Potosi bordering thereon.

‡ It is impracticable to enter here into the history of the separate countries; the inquirer will find further and accurate information in the works of Don José de Acosta, H. Benzoni, Benaduci Boturini, Brasseur, Brownell, T. de Bussière, Carlier, M. Chevalier, Fr. Clavigero, Epinosa, Gallatin, Greg. Garcia, Gomara, Humboldt, Ixtlilxochitl, Kingsborough, Las Casas, Mayer, Möke, Motolinia, Munoz, Oviedo y Valdez, Man. Payno, Prescott, Ramirez, Ruxton, Sahagun, Ant. de Solis, Solorzano, Ternaux-Compans, Tezozomoc, Torquemada, Tyler, Uhde, Ulloa, Veytia.

had contested the fact. But Don Francisco Pimentel* has lately vindicated the opinion of these two writers, and proved that the Chichimecs possessed an entirely peculiar language;† consequently they could not have belonged to the Toltec family. In view of this now admitted fact, I can but deem it highly improbable that the Chichimecs arrived in northern Mexico by the same route with the other immigrating tribes, which were all related to one another, being members of the same race, and having probably inhabited a common land of nativity. But if the home of the Chichimecs was a different one from that of the other wandering populations, this circumstance would have naturally prescribed to them a different path to the south. Perhaps they constitute the branch which, in the opinion of many, advanced, as has been already mentioned, on the further side of the Rocky mountains to the banks of the Gila.

The Chichimecs had scarcely established themselves in Mexico when the immigration of those seven tribes took place, which are known by the common name of Nahuatlacas, and which spoke the same tongue as the Toltecs, to whose family also they belonged. Of these seven tribes, six first made their appearance, following closely on one another, namely, the Xochimilcos, Chalcas, Tepanecas, Tlahuicas, Colhuas, and Tlaxcaltecas; while the seventh, the celebrated Aztecs, arrived after a longer interval. In the mean time the Acolhuas also had appeared upon the theatre, but had soon become intermingled with the Chichimecs, who already possessed the country, forming by this union the kingdom of Acolhuacan.

It was in 1090 that the Aztecs, the seventh of the Nahuatlaca race, and speaking the Nahuatl tongue,‡ issued from Aztlan, their original but unknown home, which, as above stated, is to be sought in the region of the great American lakes. The Aztec annals which have come down to us enable us partially to trace this family in its wanderings, even if it be not possible for us to identify the geographical sites to which tradition gives a name. The year 1091 finds the Aztecs at Quahuatl-Icacan. In 1116 they are at Quinehuayan-Oztotl and Quinehuayan-Chicomoztoc. Hence they made their way to Teo-Culhuacan, though it is impossible to distinguish the intermediate places which they visited. Their history begins to clear up with their arrival in Acahualtzinco, where they sojourned nine years, (1143.) Their onward march brought them into the province of Cohuatlycamac, not far from the ancient Tollan, then to Coatepec, which they reached in 1174, and where they settled for some time. Finally, between the years 1186 and 1194, about a century after they had issued from their home of Aztlan, the Aztecs appeared on the table land of Anahuac, never more to forsake it. It falls not within the scope of this essay, which deals merely with the migration, to speak of the further history of the Aztec kingdom, whose splendor and power are otherwise well known.§

In the south of Mexico, as before remarked, there existed an ancient civilization, which we would designate as the *palencan*, and which, agreeably to the latest researches, is to be regarded as the oldest in America. The regions

* In his valuable work, *Cuadro descriptivo y comparativo de las lenguas indigenas de Mexico*, (Mexico 1862-'65,) of which two volumes have appeared.

† A grammar of the Chichimec language was composed by the monk Diego Diaz Pangua, who was born in Durango, and died in the year 1631; it was entitled *Arte de la lengua Chichimeca*. He was the author also of a Chichimec dictionary, and a catechism in the same language; his works, however, have remained in manuscript.

‡ Brasseur notices the similarity of sound between the words Nahuatl and the English Know-all, their signification, moreover, being the same.

§ Brasseur de Bourbourg, *Hist. de Nations Civ. du Mexique*, vol. I. Since the study of the remains of Mexican constructions is of the highest importance for the history of the country, I enumerate the following places where the most remarkable ruins of this kind occur: The districts of Papantla, Cholula, and Teotihuacan, where terraced pyramids are found; Mapilca, Tusapan, Isla de Sacrificios, Puente Nacional, Misantla, in the State of Vera Cruz, Tezcucoc, Tezcocingo, Xochicalco in the State of Mexico, Quioatepec, Zachila, Coyula, S. Juan de los Cués, Mitla in Oaxaca.

where its monuments occur, Chiapas, Guatemala, and Yucatan,* are inhabited by the family which use the Maya-Quiché dialect, which some suppose to be derived from the Toltecs.† But Orozco y Berra contests this supposition, and justly, because the Quiché, with its two related idioms, the Cachiquel and Zultuhi, belongs to a family of languages wholly different from the Nahoas; and the Maya was limited to the little-known peninsula of Yucatan and some contiguous territories. It is impossible to determine the time at which the immigration of the Maya tribes commenced, or which of them first appeared in the country. From the multiplicity of the dialects of this group of languages, we are justified in concluding that Mayas and Quiches had, at a very early epoch, separated from one another, the language of the former changing less than that of the latter, who, at a later period, came into contact with the Toltecs, living north of them. Of the primitive population which erected the numerous monuments‡ of the region in question, history has no further knowledge than that they were the possessors of a civilization far in advance of that of the races which we are inclined to regard as the aboriginal people of Mexico, though it bore no resemblance to that of the northern Nahoas.

As the Toltecs, after the fall of their dominion in Mexico, migrated to Guatemala and Nicaragua, they probably pressed further south the populations which then occupied those countries, and finally founded in Central America itself several small kingdoms, traces of which are not yet extinct. By late and very competent inquirers the hypothesis has been advanced that the surprising constructions of Central America and Yucatan belong not to so early a period as is commonly assumed, but are the work of later times, perhaps even of the civilized Indian races which inhabited the land at the arrival of the Spaniards, or at least of their immediate predecessors. The traveller, Stephens, and the skilful observer, Brantz Mayer, have advanced, in support of this view, many weighty and ingenious considerations; and I was myself inclined to adopt the opinion that at least the migrating Toltecs, who had already earned so much distinction as architects in their own country, should be regarded as the builders of these remarkable monuments, thus assigning to them an age not more remote than the twelfth century. But a more careful comparison of these remains with those of undoubted Toltec origin, added to the recently ascertained fact that the hieroglyphic characters found on them bear not the least resemblance to the rest of the picture-writing of Mexico, place it beyond all doubt that these monuments belong to an earlier and, indeed, very ancient epoch.§ The traces of the mi-

* On the history of Yucatan, see Cogolludo, *Historia de l' Yucatan*, Madrid, 1688, fol. —; Fancourt, *History of Yucatan from its discovery to the close of the 17th century*, London,

† The distinguished archeologist, G. E. Squier, goes so far as to derive the Toltecs from Central America.

‡ In Yucatan alone, thanks to the diligent researches of MM. Norman and Stephens, may now be counted the ruins of fifty-four cities. The most remarkable are Uxmal, Chichen-Itza, Maxcanu, Sacbey, Xampon, Sanacte, Chunhuhu, Labpakh, Iturbide, Mayapan, Ticul, Nochacab, Xoch, Kabah, Sabatsche, Labna, Kenick, Izamal, Saccacal, Tekax, Akil, Mani, Macoba, Becanchen, Peto in the interior. Tulloom, Tancan, and the island Cozumel in the east; in Chiapas, Palenqué, Utlatan, Ococingo; in Guatemala, the ancient ruins of the Quichés in the districts of Totonicam and Quesaltenango; in Honduras, the monolithic pyramids of Copan; and quite in the east of the country, the old city of Olanchó.

§ For the history of Central America recourse may be had to the following writers: Aviles: *Historia de Guatemala*, 1866.—Pelaez: *Memoria para la Historia del Antigue Reyno de Guatemala*, 1852, 3 vols.—Villagutierrez: *Historia de la Conquista y Rendicion de varias Provincias del Reyno de Guatemala*. Madrid, 1701, fol. —.—Ximenes: *Las Historias del Origen de los Indios de esta Provincia de Guatemala, Traducidas de la lengua Quiché*, Vienna, 1857; an excellent and most important work of my highly honored benefactor, Dr. C. v. Scherzer. Oersted, *l' Amerique Centrale*, Kopenhagen, 1863.—Reichard: *Nicaragua*, Braunschweig, 1854.—Reichard: *Centro America*, 1851.—Scherzer: *Wanderungen Dusch die Mittelamericanischen Freistaaten, Nicaragua, Honduras, und S. Salvador*, Braunschweig, 1857.—Squier: *Nicaragua, its People, Scenery, Monuments*, New York, 1852, 2 vols.—Squier: *Notes on Central America*, New York, 1855.—Squier: *The Archeology and Ethnography of Nicaragua*, (Transact. American Ethnol. Society, vol. III, 1852.)—Wagner and Scherzer: *Die Republik Costa Rica*, Leipsig, 1856.

gration are not susceptible of being followed in Central America with the same certainty as in the more northern Mexico. To the philologist alone it pertains to investigate, in the manifold dialects of the former country, the intermixture of the Nahuatl element as it spread southwardly to Nicaragua, and thus to supply incontrovertible proofs of the migration.

A wide space separates the ruins of Palenqué and Olancho from the elevated lands of Cundinamarca. A dense obscurity rests upon the countries of the isthmus, Costa Rica, Chiriqui, Panama, and Choco; but imperfectly explored in relation to geography, they are still more unknown in relation to archeology. On the luxuriant and picturesque shores of Lake Nicaragua we lose, as it were, the bond which might connect the populations of the north and south continents of America. For ten degrees of latitude nearly all traces of the past vanish, and it is only on the South American main land, in the mountains of New Grenada, that we again perceive a gleam of dawning civilization, which was for a long time almost wholly overlooked. Yet a doubt can scarcely exist but that the migration continued to advance in those little known districts of the isthmus. In Chiriqui have recently been discovered and explored some of the burial places of the natives,* which are similar to those known in Peru by the name of huacas. Were these districts more thoroughly explored, it is quite probable that the search would be rewarded by the discovery of sepulchral or other vestiges of civilization, calculated to throw more light on the fortunes of these provinces.

On the South American continent the points which offer themselves for the prosecution of our inquiry respecting the migration are of far less frequent occurrence than in the northern portion of America. That part of the Cordilleras of the Andes, whose western foot is bathed by the Rio Magdalena, and which, stretching in a northeast direction, forms the lofty plains of Bogotá and Tunja, which further south rises into the profound solitudes of Paramo de Suma Paz, was inhabited at the time of the discovery of these countries by the Chibcha race,† whom the Spaniards improperly denominated Muyscas.‡ These people still exist in the country, but have almost entirely forgotten their ancient language, which was soft, flowing, and copious.§ As far as is known to myself, nothing has as yet been found to enlighten us respecting an immigration of this race, unless it be their peculiar legend of the mythical personality of Bochica, which certainly possesses a striking resemblance to the Quetzalcohuatl of the Toltecs. There can be little doubt that the obscurity which rests on the past history of the Chibchas will be greatly dispelled by the indefatigable ardor of Dr. Ezequiel Uriocoechea,|| of Santa Fé de Bogota, who has applied the re-

* King Merritt: *Report on the huacas or ancient graveyards of Chiriqui*, read before the Ethnological Society, New York, 1860.

† The land of the Chibchas comprised the lofty plateaus of Bogotá and Tunja, the valleys of Fusagasuga, Pacho, Caqueza, and Tensa, together with the whole of the districts of Ubaté, Chiquinquirá, Moniquirá, and Leyva, and could in ancient times number a population of 2,000 to the square league, thus falling little if at all behind the most thickly peopled tracts of Europe. The Chibchas were a people of somewhat advanced civilization, possessing temples of the sun with stone pillars, remains of which have been found in the valley of Leyva. Monuments peculiar to the Chibcha architecture occur in the Cojines of Tunja, the Calzada of the plain of Pataqué and the ruins of Inferito. The Chibchas, however, seem never to have attained the degree of culture of the more southern Peruvians.

‡ A. V. Humboldt reproves this use of the term Muysca, which in the Chibcha language simply means "man." (Ans. d. Nat., ii, 270.)

§ The best book which we yet have respecting this remarkable people is that of Joaquin Acosta, *Compendio historico del descubrimiento y colonizacion de la Nueva Grenada*; Paris, 1848.

|| To this writer, who is at present occupied in publishing the "Monumenta Chibcharum," we already owe the valuable work *Memoria sobre las antiquedades neo-granadinas*, Berlin, 1854.

courses of a rare sagacity to the solution of this difficult problem. Only when we shall have verified the place of the Chibchas in the circle of the other American races, can we hope to detect the traces of any possible shifting of the population. On the neighboring high lands of Quito, on the other hand, we meet with some indications of such an occurrence, if but faint ones. As early as the year 980, Caran Schyri conquered the kingdom of Cara. The Cara race inhabited the coast from the river Charapotó to Cape S. Francisco, and is said to have come from over the sea. History does not distinctly inform us whence it sprung, nor at what time its colonization took place.* Nevertheless, it might be possible to connect its appearance with the common American migration, which, if it generally reached South America, arrived there in a much attenuated condition.

Peru is to the southern division of America what Mexico is to the northern. It is, moreover, the only point of South America in which distinct indications of an immigration present themselves. In the absence of these, the hypothesis might perhaps be tenable that the migration terminated at the lake of Nicaragua without having attained the South American mainland. But the fact that the numerous relics of civilization in Peru clearly point to two different periods of culture, and proceed from two different races of men, one of which immigrated at epochs capable of being historically determined, could scarcely be explained without bringing this incident into connexion with the general migration. While the origin of the Peruvian kingdom, like that of all these races, loses itself in a cloud of myths;† while many extinct tribes, as the Chinchas or Yungas, and the Huancas, may still be identified; while the extensive structures near Tiahuanuco on Lake Titicaca,‡ the ruins of the once gorgeous temple of Pachacamac§ on a mountain by the sea, to the southeast of Lima, and perhaps also the ruins of the ancient Caxamarquilla,|| are derived from the once powerful Aymara nation, which inhabited the land in early times, as their chulpas¶ or sepulchral mounds still attest, there arrived on the elevated plains of Quito and Cuzco, in the year 1021 of our era, a warlike people, whom I propose to call, from their rulers, the Inca race. Manco Capac, the first of these lords of the sun, founded, in 1050, the city of Cuzco,** while under his successor, Sinchi Roca, the Aymaras withdrew further west, in order to evade the domination of the Incas. Under the following emperors, Lloque Yupanqui and Mayta Capac, war was made upon the Aymaras, who were compelled still to recede. Finally, in the fifteenth century, the Inca Capac Yupanqui drove the native races before him

* The first king founded the city of Cara on the bay of Caraquí between the years 700 and 800. The Caras conquered under Schyris I, to Schyris VIII, all the small separate states which existed in that region, and continued as the kingdom of Quito under the dynasty of the Schyris of Cara until the year 1487, when the powerful Inca Hayna Capac conquered their kingdom and reduced it to a province of Peru. (Velasco, *Historia de Quito*.)

† Many of which recall those of the highlands of Anahuac, as, for example, that of Queralcohuatl.

‡ On two islands of the lake are seen the temples of the sun and moon, together with the cloister of the virgins dedicated to the moon. On the genuine ruins of Tiahuanuco is everywhere recognized the symbol of the sun, and I am therefore persuaded that the Incas did not, as is commonly thought, bring with them the worship of the sun, but, rather, found it already in the country and adopted it.

§ Pachacamac (that is, creator of the earth, from patcha, earth, and camac, participle of camanê, I make) was the supreme God of the Indians of Peru.

|| In a part of the valley of Rimac.

¶ The graves of the Changos and Quechuas are called huacas, which means, according to some writers, place of weeping; (see, on the signification of this word, Prescott's *Hist. of the Conquest of Peru*, vol. i, p. 93;) they occur in great numbers, especially in the hills of Cocotea, Tamba, and Mejillones, in the environs of Iquique, and in the Morro of Arica.

** Cuzco, the Ccozco of the Incas, signifies in the Quechua language, "navel"—that is, centre of the kingdom.

as far as Chili, where, at length, the brave tribe of Chalchaqui Indians opposed to the ambitious Incas an effectual resistance.*

If it be considered that the Inca dynasty in Peru presents more than one resemblance to the civilized Toltecs of Mexico; that in the traditions of both many points of coincidence occur, and, what perhaps is of most weight, that the time of the appearance of the Incas in Peru agrees in a surprising degree with that at which the Toltecs, after the subversion of their kingdom, might have reached the country, we shall scarcely be disposed to reject the surmise of A. v. Humboldt, that in early epochs a procession of the later Inca races took place over the table land of Mexico. Their arrival in Peru would thus constitute the last step of the great American migration. The ingenious arguments by which Humboldt weakened without overthrowing his own conjecture are well known, leaving the question open whether the Toltec races which passed into the southern hemisphere proceeded by the way of the cordilleras of Quito and Peru, or through the plains lying east of the Andes to the banks of the Marañon.

In the remaining tracts of the South American continent there occur but few traces of civilization of a quite inferior grade. The migration, as far as is yet known, did not penetrate into these regions, but was confined to the western part of the range of the Andes. Even in southern Chili and Patagonia nothing of such an event is distinguishable. All that is found in the low lands of South America pertaining to human culture consists of a sort of runic characters, either carved or painted on stone, which are of very doubtful signification. We meet with such hieroglyphic symbols not far from Tijuca, in the diamond district of Minas Geraes, in Brazil; further north, near Ceará; in the province of Bahia, on the Serra do Anastasio, and in the scarcely explored wilderness of Piauhý; they occur next in the province of the Alto Amazonas, on the banks of the Rio Hyapura; near Montalegre, in the province of Pará, and on the Rio Negro and Rio Ucagari, or Uaupes. The tradition of the Zome, existing among the Indians of the province of Bahia, and which bears some resemblance to the Bochica of the Chibchas, and the Quetralcohuatl of the Toltecs, would seem to show that an element of culture had penetrated into the country from without.† Some countenance seems to be given to this supposition by the statement of the oldest authorities that, of the two groups of inhabitants who occupied Brazil at the time of its discovery, one regarded the other as being more recent intruders. If it be true, however, that there once existed in the low lands of Brazil, as in the interior of the United States of North America, the seat of a not wholly uncivilized race of aborigines, the fact must at least ascend into such remote prehistoric times that every trace thereof may have well been obliterated.‡ “For,”

* Respecting the history of Peru see the following works—Balboa: *Histoire du Perou*.—Beauchamp: *Histoire de la Conquête et des Révolutions de Perou*, Paris, 1808.—Bellesteros: *Ordenanzas del Peru*, Lima, 1685.—Colpaert: *Etude sur le Perou*, Paris.—Desjardines: *Le Perou avant la Conquête Espagnole*, Paris, 1858.—Fernandez: *Historia del Peru*, Sevilla, 1571.—Garcilasode la Vega: *Comentarios Reales*, 1609, and *Hist. General del Peru*, 1616.—Gosse: *Dissertation sur les Races qui Composaient l'Ancienne Population du Perou*, Paris, 1860.—Markham: *Travels in Peru and India*, London, 1862.—Marmontel: *Les Incas*, Frankfurt, 1792.—Peralta: *Lima Fundada, Poema Eroycs*, Lima, 1732.—Perez: *Notice sur les Guipos des Anciens Peruvians*.—(Rev. Amer., 1864.)—Prescott: *Hist. of the Conquest of Peru*, New York, 1847.—Rivero y Tschudi: *Antiquedades Peruanas*, Vienna, 1851.—Xerez: *Conquista del Peru*, Salamanca, 1547.—Zarate: *Historia del Descubrimiento y Conquista del Peru*, Sevilla, 1537.

† Handelmann, *Geschichte von Brasilien*, Berlin, 1860, p. 7–11.

‡ There is, of course, no literature properly relating to the ancient history of these countries, but scattered notices may be found in the following works, in which, moreover, the whole of their history since the conquest is comprised—Angelis: *Colleción de obras y Documentos relativos a la Historia Antigua y Moderna de las Provincias del Rio de la Plata*, Buenos Ayres, 1836.—Arenales: *Noticias Historicas y Descriptivas sobre el gran pais del Chaco y Rio Bermejo*, Buenos Ayres, 1833.—Baralt: *Resúmen de la Historia de Venezuela*, Paris, 1841.—

as an accurate observer of the country writes, "the whole island which lies between the Atlantic ocean on one side, and the river Amazon, along the Rio da Madeira, and the Paraguay and Parana on the other, seems never to have been penetrated by the slightest degree of civilization; nowhere is there a manifestation of mental activity or aim rising above the merest physical necessities; and the Indians of the Brazilian forests, who no doubt receded before the peculiar civilization of the western Cordilleras of South America, as they recoil to-day, as long as is possible, from that which approaches them on the east, constitute the most unreasoning and incapable of creatures."* In the absence of other monuments, no hypothesis, I think, dissenting from this statement of facts, can be advanced, much less defended. The scattered inscriptions which have been found seem to afford no sufficient ground for the adoption of sweeping conclusions, which, in the interests of science, moreover, it were better to avoid.

An attempt has been made in the above pages to follow the memorable phenomenon of the migration of tribes in America through its entire course, or, in other words, its geographical propagation, and to present the reader with a comprehensive, if reduced, sketch of it. Should we at last be forced to confess that darkness rather than light has met us at the different points of our investigation, there yet remains the hope that, through the persevering labors of the learned world of America, our knowledge in this hitherto but little favored field of inquiry will ere long receive new and gratifying accessions.

APPENDIX TO THE FOREGOING ARTICLE.

[The investigations given in this paper relate exclusively to the migrations and not to the origin of the American races, and, therefore, the author need not have introduced the vexed question of the latter. But since he has done so, it may be proper to give in this place a brief statement of the scientific considerations which favor the generally received opinion as to the original seat of the human race.

The spontaneous generation of either plants or animals, although a legitimate subject of scientific inquiry, is as yet an unverified hypothesis. If, however, we assume the fact that a living being will be spontaneously produced when all the physical conditions necessary to its existence are present, we must allow that, in the case of man, with his complex and refined organization, the fortuitous assembly of the multiform conditions required for his appearance would be extremely rare, and from the doctrine of probabilities could scarcely occur more than at one time and in one place on our planet; and further, that this place would most probably be somewhere in the northern temperate zone. Again, the Caucasian variety of man presents the highest physical development of the human family,

Barco Centinera: *Argentina y Conquista del Rio de la Plata*, Poema ap. Barcia.—Beauchamp: *Histoire du Brazil*, Paris, 1815.—Charlevrix: *Geschichte v. Paraguay*, Wien, 1830.—Escilla Zuniga: *La Auracana*, Poema Eroico, Madrid, 1733, fol.—Havestadt: *Chilidugu*, Monast. Westphal., 1777.—Lallemant: *Histoire de la Colombie*, Paris, 1826.—Molina: *Saggio Sulla Storia Civile del Chile*, Bologna, 1787.—Oña: *Arauco Domado.*, Poema, Madrid, 1605.—Ovalle: *Historia del rey de Chile*, Roma, 1648, fol.—Oviedo y Baños, *Historia de la Conquista y Poblacion de la Provincia Venezuela*, Madrid, 1723.—*Revista Trimensal del Instituto Hist. Geog. e Ethnographico do Brasil*, Rio de Janeiro.—*Revista de Buenos Ayres*, since 1863.—Smyth: *The Auracanians*, New York, 1855.—Ternaux-Compans: *Notice Historique sur la Guyane Francaise*, Paris, 1843.—Tessillo: *Guerra de Chile*, Madrid, 1617.

* Dr. Avé Lallemant, of Lubeck, in a letter addressed to me, January 27, 1866, on the primitive condition of the natives of Brazil, see further the instructive work, *Os Indigenas do Brazil Perante a Historia*, Rio de Janeiro, 1859, by the learned and ingenious Portuguese poet, J. Magelhaes, residing at that time, as Brazilian minister, at Vienna; also that of V. L. Baril de la Hure, entitled *Les Peuples du Brésil avant la Découverte de l'Amerique*.

and as we depart, either to the north or south, from the latitude assumed as the origin of the human race in Asia, we meet with a lower and lower type until at the north we encounter the Esquimaux, and at the south the Bosjesman and the Tierra Fuegian. The derivation of these varieties from the original stock is philosophically explained on the principle of the variety in the offspring of the same parents, and the better adaptation and consequent chance of life, of some of these to the new conditions of existence in a more northern or southern latitude.

Furthermore, as the author has shown, the migrations on the American continents have principally been from north to south, and it is an interesting fact, fully confirmed by the observations of the explorers of the route for the Russian American telegraph, that the waters of Behring's Straits are frozen over probably every year as late as April, and that intercourse, at present, is constant by means of canoes in summer between the Asiatic and American sides. As another fact relating to the same question, we may state that, while the Asiatic projection near Behring Straits is almost a sterile rocky waste, the opposite coast presents a much more inviting appearance, abounding in trees and shrubs. Moreover, the climate, when we pass southward of the peninsula of Alaska, is of a genial character, the temperature continuing nearly the same as far down as Oregon. The mildness of this temperature, and the descent of the isothermal line, or that of equal temperature along the coast, are due to the great current called the gulf stream of the Pacific, which carries the warm water of the equator along the eastern coast of Asia, thence across to the opposite coast of America, and along the latter on its return to the equator. The action of this current, which does not appear to have been considered by the ethnologist, must have had much influence in inducing and determining the course of the migrations. We may add to the foregoing that the present inhabitants of the countries contiguous to Behring's Straits on the two sides, in manners, customs, and physical appearance, are almost identical.

J. H.]

INDIAN POTTERY.

BY CHARLES RAU.

IN former times, when the aboriginal inhabitants of this country were still in possession of their own lands, and their mode of living had not been changed by the intrusion of the pale-faced Caucasian, the art of pottery was practised by them to a considerable extent. This branch of industry lost, however, much of its importance among the Indians so soon as they discovered the superiority of the vessels of metal, which they obtained in trafficking with the whites, and the durable kettle of iron or copper soon replaced the fragile and far less serviceable cooking utensil of clay. The beginning of the decline of this aboriginal art is, therefore, of an early date, and at the present time it may be considered as almost, if not entirely, extinct among the tribes still inhabiting the territory of the United States, excepting some in New Mexico and Arizona, who have not yet abandoned the manufacture of earthenware. As late as 1832, when Mr. Catlin visited the nations of the Upper Missouri, he found the Mandans still diligently practising the ceramic art; but the ravages of the small-pox have reduced their number to a few, and it is probable that vessels of clay are no longer made in those regions.

The Iroquois, of New York, those survivors of the once powerful Confederation who have escaped the fate of being driven toward the setting sun, and are still permitted to dwell upon their native soil, have ceased long ago to fabricate earthen vessels. So I am informed by Dr. Peter Wilson, De-jih-non-da-weh-hoh, grand chief of the Six Nations of New York. "The manufacture of pottery," says my correspondent, "has long since been discontinued among our people; like most other utensils, clay vessels have been superseded by utensils of the manufacture of the race who introduced among us the implements which are more durable and convenient. Such implements and other articles used among us only remain, or are being manufactured, as are not superseded by articles which the ingenuity of the pale face replaces." The same remark can probably be applied to the other tribes east of the Rocky Mountains.

That the fabrication of earthenware was once carried to a great extent among the Indians, is shown by the great number of sherds which lie scattered over the sites of their former villages and on their camping places; but they are, perhaps, nowhere in this country more numerous than in the "American Bottom," a strip of land which extends about one hundred miles along the Mississippi, in Illinois, and is bounded by the present bank of that river and its former eastern confine, indicated by a range of picturesque wooded hills and ridges, commonly called the "Bluffs." This bottom, which is on an average six miles wide and very fertile, was formerly the seat of a numerous indigenous population, and abounds in tumular works, cemeteries, and other memorials of the subdued race. Among the lesser relics left by the former occupants may be counted the remnants of broken vessels, which occur very abundantly in various places of this region. These fragments are, however, mostly small; and, according to my experience, entire vessels are not found on the surface, but frequently in the ancient mounds and cemeteries, where they have been deposited with the dead as receptacles for food, to serve on their journey to the happy land of spirits.

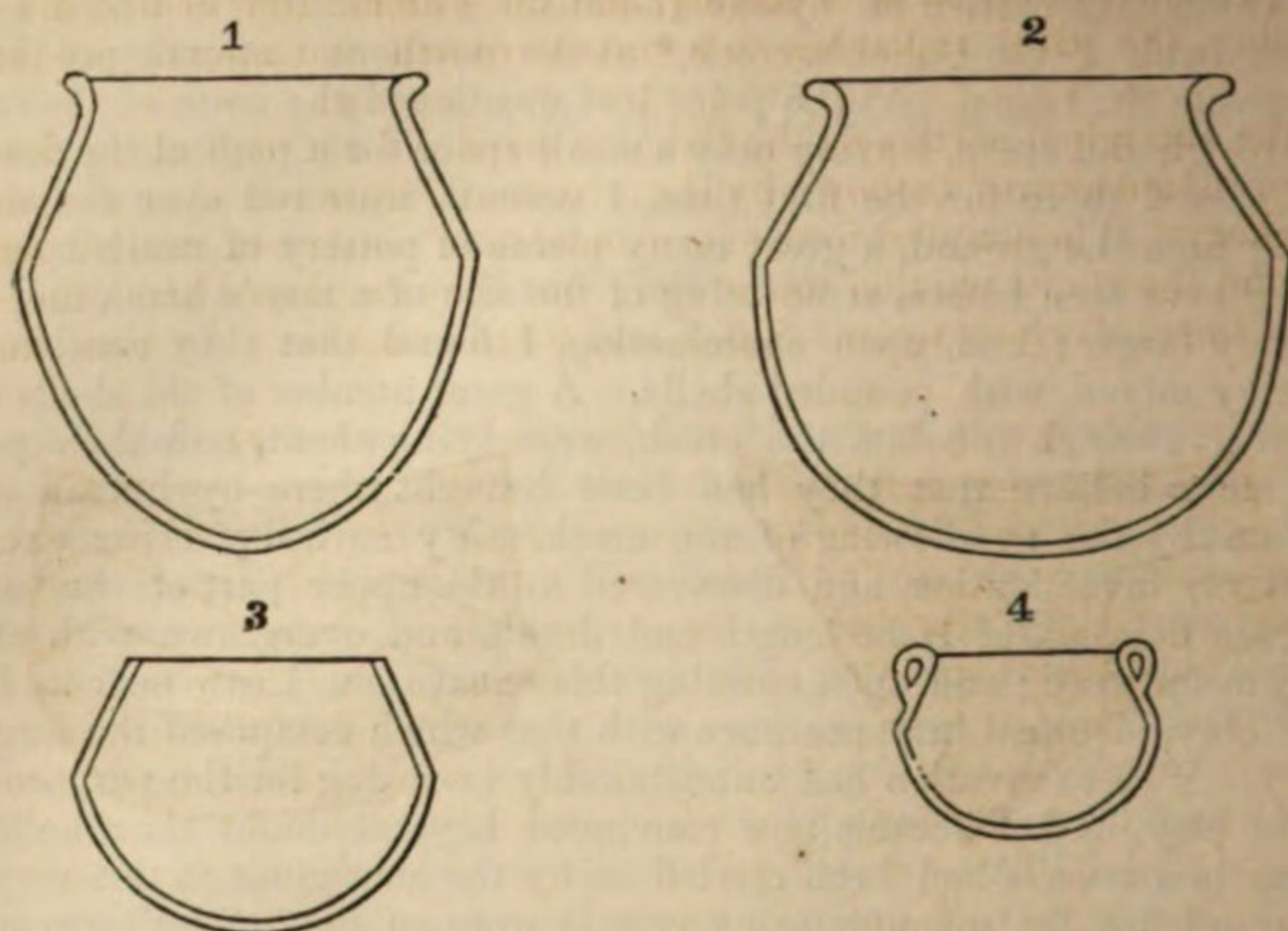
About six years ago, while living in the west, I was much gratified by the discovery of a place in the American Bottom where the manufacture of earthenware was evidently carried on by the Indians. The locality to which I allude is the left bank of the Cahokia creek,* at the northern extremity of Illinoistown, opposite St. Louis. At the point just mentioned the bank of the creek is somewhat high and steep, leaving only a small space for a path along the water. When I passed there for the first time, I noticed, scattered over the slope or protruding from the ground, a great many pieces of pottery of much larger size than I had ever seen before, some being of the size of a man's hand, and others considerably larger; and, upon examination, I found that they consisted of a grayish clay mixed with pounded shells. A great number of old shells of the *unio*, a bivalve which inhabits the creek, were lying about, and their position induced me to believe that they had been brought there by human agency rather than by the overflowing of the creek. My curiosity being excited, I continued my investigation, and discovered at the upper part of the bank an old fosse, or digging, of some length and depth, and overgrown with stramonium or jimson weed; and upon entering this excavation, I saw near its bottom a layer of clay, identical in appearance with that which composed the fragments of pottery. The excavation had unmistakably been dug for the purpose of obtaining the clay, and I became now convinced beyond doubt that the fabrication of earthen vessels had been carried on by the aborigines at this very spot. All the requisites for manufacturing vessels were on hand; the layer of clay furnished the chief ingredient, and the creek not only supplied the water for moistening the clay, but harbored also the mollusks whose valves were used in tempering it. Wood abounded in the neighborhood. All these facts being ascertained, it was easy to account for the occurrence of the large fragments. Whenever pottery is made, some of the articles will crack during the process of burning, and this will happen more frequently when the method employed in that operation is of a rude and primitive character, as it doubtless was in the present case. The sherds found at this place may, therefore, with safety be considered as the remnants of vessels that were spoiled while in the fire, and thrown aside as objects unfit for use.

I did not succeed in finding the traces of a kiln or fireplace, and it is probable that the vessels were merely baked in an open fire, of which all vestiges have been swept away long ago. The occurrence of the broken pottery was confined to a comparatively small area along the bank, a space not exceeding fifty paces in length, as far as I can recollect. They were most numerous in the proximity of the old digging, and at that place quite a number of them were taken out of the creek into which they had fallen from the bank. Farther up the creek I saw another excavation in the bank, of much smaller dimensions, and likewise dug for obtaining clay. Among the shells and sherds I noticed many flints which had obviously been fashioned to serve as cutting implements; they were, perhaps, used in tracing the ornamental lines on the vessels or in smoothing their surfaces.

I did not find a single complete vessel at this place, but a great variety of fragments, the shape of which enabled me to determine the outline of the utensils of which they originally formed parts. This was not a very difficult matter,

* This creek runs in a southwardly direction through Madison county and a part of St. Clair county, and empties into the Mississippi four miles below St. Louis, near the old French village of Cahokia.

especially in cases when portions of the rim remained. Figures 1 and 2 represent (in sections through the middle) the prevailing forms of the vessels.



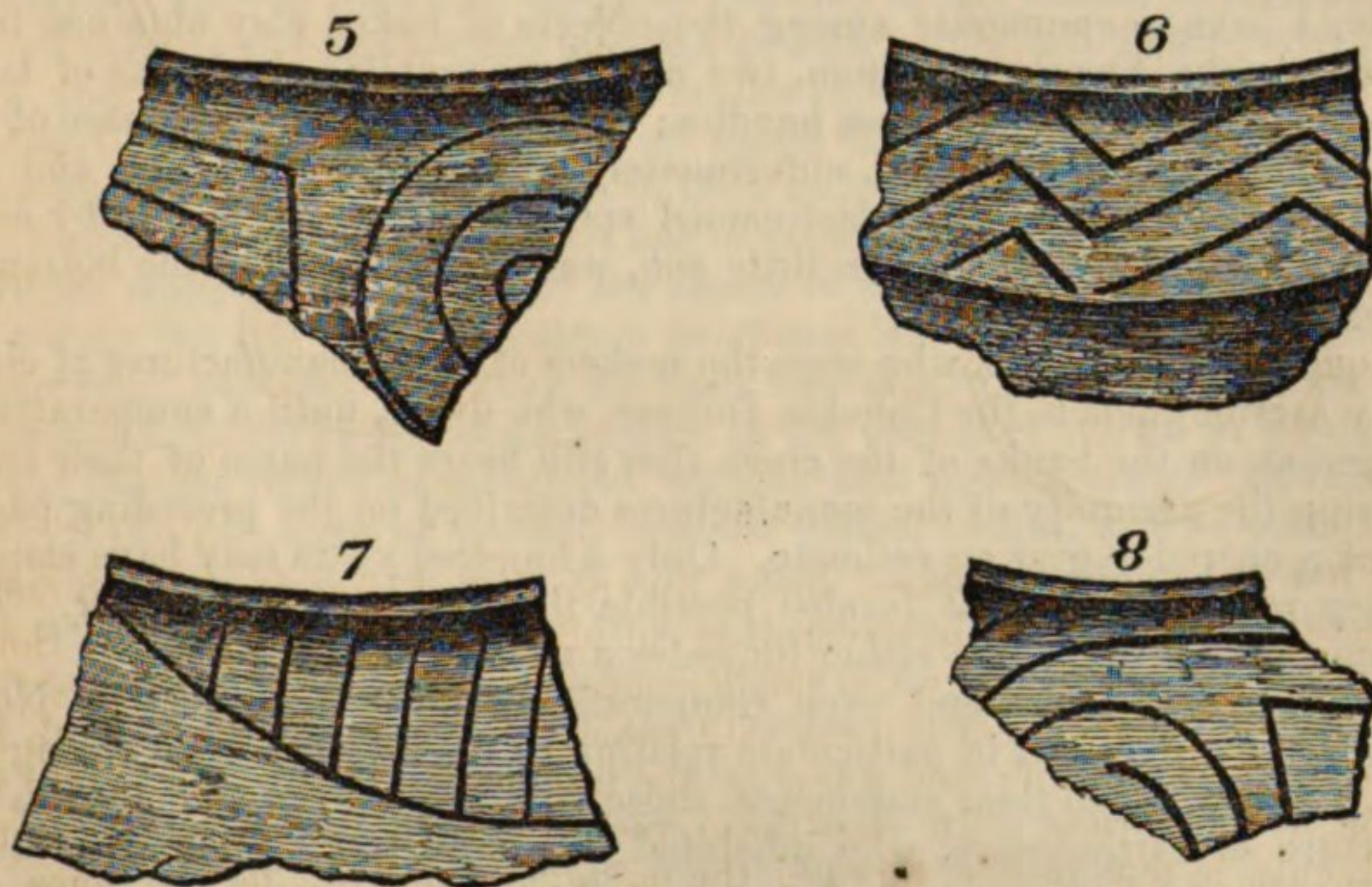
The rim, it will be seen, is formed into a lip and turned over, in order to facilitate suspension; sometimes, however, it is cut off abruptly, as in Fig. 3. Some of the vessels—more especially the smaller ones—were provided with ears, like Fig. 4;* others had the outer rim set with conical projections or studs, both for convenience and ornament; and a few of the fragments exhibit very neatly indented or notched rims. In size these vessels varied considerably; some measured only a few inches through the middle, while the largest ones, to judge from the curvature of the rims, must have exceeded *two feet in diameter*. The bottom of the vessels mostly seems to have been rounded or convex. I found not a single flat bottom-piece. This, however, may be merely accidental, considering that flat-bottomed vessels were made by the Indians. The appearance of the fragments indicates that the earthenware was originally tolerably well burned, and the fracture exhibits in many instances a reddish color. But, as the art of glazing was unknown to the manufacturers, it is no wonder that the sherds, after having been imbedded for many years in the humid ground, or exposed to rain and the alternate action of a burning sun and a severe cold, are now somewhat brittle and fragile; yet, even when new, this aboriginal earthenware must have been much inferior in compactness and hardness to the ordinary kind of European or American crockery.

The thickness of the fragments varies from one-eighth to three-eighths of an inch, according to the size of the vessels, the largest being also the strongest in material. But in each piece the thickness is uniform in a remarkable degree; the rims are perfectly circular, and the general regularity displayed in the workmanship of these vessels renders it almost difficult to believe that the manufacturers were unacquainted with the use of the potter's wheel. Such, however, was the case. I have already mentioned that the clay used in the fabrication of this earthenware is mixed with coarsely pulverized unio-shells from the creek; only a few of the smaller bowls or vases seem to consist of pure clay. The vessels were covered on the outside, and some even on both sides, with a thick coating of paint, either of a black, dark brown, or beautiful red color, and

* I possess a small food vase of this shape, which was taken out of an old Indian grave on the "Bluffs," near French village, six or seven miles east of Illinoistown. It was, perhaps, made at the very place which I have described.

in some fragments the latter still retains its original brightness. Only *one* color, however, was used in the painting of each article. It is evident that the coloring preceded the process of baking, and the surfaces thus coated are smooth and shining, the paint replacing to a certain extent the enamel produced by glazing.

That the aboriginal potters on the Cahokia creek did not neglect the decorative art in their manufactures, is shown by the ornamental lines traced on the surface of their crockery. The simplest form of ornamentation consists in straight lines running around the vessel parallel to the rim; but they employed also other combinations of lines, of which figures 5, 6, 7, and 8 are examples. In some instances



the *inside* only was ornamented. The lines are mostly drawn with great regularity, and sometimes one-eighth of an inch wide, with a corresponding depth. I obtained, however, from the deposit at the Cahokia creek one small fragment, which exhibits a much higher degree of skill in the art of decoration than any of the others



found at the same place. Figure 9 represents it in full size. This specimen is about three-sixteenths of an inch thick, and consists of clay with an admixture of pulverized granite, the components of which—quartz, feldspar, and mica—can be plainly distinguished in the fracture. It is well baked and of a light-gray color. The ornamental lines and notches are impressed, or, perhaps, scooped out, with the greatest accuracy, and the vessel, when complete, must have presented a very good specimen of aboriginal ceramic art. Whoever compares the annexed drawing with Fig. 5 on Plate 46 of the “Ancient Monuments of the Mississippi Valley,” by Squier and Davis, will find

that the originals of the representations are nearly alike in point of ornamentation. The latter drawing delineates a part of a vase found in one of the ancient mounds of Ohio. Having seen the best specimens of “mound” pottery obtained during the survey of Messrs. Squier and Davis, I do not hesitate to assert that the clay vessels fabricated at the Cahokia creek were in every respect equal to those exhumed from the mounds of the Mississippi valley, and Dr. Davis himself, who examined my specimens from the first-named locality, expressed the same opinion.

One of the methods employed by the Indians in the manufacture of earthenware was, to weave baskets of rushes or willows, similar in shape to the vessels they intended to make, and to coat the inside of these baskets with clay to the required thickness; the baskets, after being destroyed by the fire, left on the outer surface of the vessels peculiar impressions, resembling basket-work, which produce a very pleasing effect, and replace ornamentation to a certain extent.*

With this method the potters on the Cahokia creek were likewise acquainted, for I found a few pieces of their ware bearing the marks just mentioned. This sort of pottery, however, is not mixed with pounded shells, but with sand, and is much better baked than the other kind; it has a pale-reddish appearance, and is not painted.

Lastly, I have to enumerate among the objects of baked clay obtained from the deposit in the American Bottom, two articles resembling the beaks of large birds, perhaps detached pot or pan handles; a flat piece, forming the base of the figure of some animal, of which, unfortunately, the tail only remains, and the remnant of a toy canoe. The last-named specimen, probably made by some affectionate Indian mother for her little son, was picked up from the bottom of the creek.

The question now arises, who were the makers of these manufactures of clay? I simply ascribe them to the Cahokia Indians, who dwelt, until a comparatively recent period, on the banks of the creek that still bears the name of their tribe. Concerning the antiquity of the manufactures described on the preceding pages, I am not prepared to give an estimate. Only a hundred years may have elapsed since they were made, yet it is also possible that they are much older. The appearance of the fragments rather indicates a modern origin.

The writings of early, and even comparatively modern, authors on North America are not deficient in particulars relating to the art of pottery among the natives. According to their statements, those tribes were most advanced in the manufacture of earthenware, who inhabited the large tracts of land formerly called Florida and Louisiana, which comprise at present the southern and southwestern States of the Union; and their testimony is fully corroborated by the character of such specimens of pottery from those parts as have escaped destruction, and are preserved in the collections of the country.† The Natchez, on the Lower Mississippi, perhaps the most civilized among the North American Indians, and supposed to be related to the Aztecs, were skilful potters. So we are told by the anonymous Portuguese gentleman called the "Knight of Elvas," who accompanied, towards the middle of the sixteenth century, De Soto on his adventurous expedition through a great portion of the North American continent, and became afterwards the chronicler of that bold Spaniard's exploits. In the province of Naguatex, he states, clay vessels were made "which differed very little from those of Estremoz or Montemor." These two towns in Portugal are noted for their earthenware.‡ *Du Pratz* mentions the "Ecore Blanc," on the

* Bartram describes a vessel of this kind which he extracted from a shell-mound on one of the islands near the coast of Georgia.—*Bartram's Travels*, Dublin, 1793, p. 6.

† "In some of the southern States, it is said, the kilns in which the ancient pottery was baked are now occasionally to be met with. Some are represented still to contain the ware, partially burned, and retaining the rinds of the gourds, &c., over which they were modelled, and which had not been entirely removed by the fire. In Panola county, Mississippi, are found great numbers of what are termed *pottery kilns*, in which are masses of vitrified matter, frequently in the form of rude bricks, measuring twelve inches in length by ten in breadth. It seems most likely that these *kilns* are the remains of the manufactories of the later tribes—the Choctaws and Natchez—'who,' says Adair, 'made a prodigious number of vessels of pottery, of such variety of forms as would be tedious to describe and impossible to name.'"—*Ancient Monuments of the Mississippi Valley*, Washington, 1848, p. 195.

‡ Virginia Richly Valued, by the Description of the Maine Land of Florida, her next Neighbour, &c. Written by a Portugall Gentleman of Eluas, employed in all the Action, and translated out of the Portugese by Richard Haklvyt, London, 1609, (reprint of 1812, Supplement,) p. 750.

Mississippi, as one of the localities where the Natchez obtained clay for their pottery, and likewise *ochre* to paint it. "When coated with ochre," he says, "it becomes red after the burning." Elsewhere, in speaking of the manufacture of clay vessels by the natives of Louisiana, the same author remarks: "The women make pots of an extraordinary size, jars with a small opening, bowls, two-pint bottles with long necks, pots or jugs for preserving bear oil, holding as much as forty pints, and, finally, plates and dishes in the French fashion."*

Dumont, who likewise describes the manners of the people inhabiting the extensive country formerly called Louisiana, has left a more minute account of the method they employed in making earthenware. He says: "After having amassed the proper kind of clay and carefully cleaned it, the Indian women take shells which they pound and reduce to a fine powder; they mix this powder with the clay, and having poured some water on the mass, they knead it with their hands and feet, and make it into a paste, of which they form rolls six or seven feet long and of a thickness suitable to their purpose. If they intend to fashion a plate or a vase, they take hold of one of these rolls by the end, and fixing here with the thumb of the left hand the centre of the vessel they are about to make, they turn the roll with astonishing quickness around this centre, describing a spiral line; now and then they dip their fingers into water and smooth with the right hand the inner and outer surface of the vase they intend to fashion, which would become ruffled or undulated without that manipulation. In this manner they make all sorts of earthen vessels, plates, dishes, bowls, pots, and jars, some of which hold from forty to fifty pints. The burning of this pottery does not cause them much trouble. Having dried it in the shade, they kindle a large fire, and when they have a sufficient quantity of embers, they clean a space in the middle, where they deposit their vessels and cover them with charcoal. Thus they bake their earthenware, which can now be exposed to the fire, and possesses as much durability as ours. Its solidity is doubtless to be attributed to the pulverized shells which the women mix with the clay."†

Adair, more than a century ago a trader with the tribes who occupied the southern portion of the present Union, confines himself to the following remarks:

"They make earthen pots of very different sizes, so as to contain from two to ten gallons; large pitchers to carry water; bowls, dishes, platters, basins, and a prodigious number of other vessels of such antiquated forms as would be tedious to describe and impossible to name. Their method of glazing them is, they place them over a large fire of smoky pitch-pine, which makes them smooth, black, and firm. Their lands abound with proper clay for that use."‡

Loskiel, who describes the manners of the Delawares and Iroquois, states that they made formerly kettles and cooking-pots of clay, which they mixed with finely pounded shells, and burned until they became black throughout. Quite large pieces of their pots, he says, in which the pounded shells could still be seen, were often found in such places where the Indians had dwelt in ancient times; but after the arrival of the Europeans very light kettles of brass had generally been introduced among them.§ Thus we see that these tribes began at an early period to neglect the manufacture of clay vessels.

A very good account relating to the art of pottery, as formerly practised by the western tribes, is given by *Hunter*. "In manufacturing their pottery for cooking and domestic purposes," he says, "they collect tough clay, beat it into powder, temper it with water, and then spread it over blocks of wood, which have been formed into shapes to suit their convenience or fancy. When sufficiently dried, they are removed from the moulds, placed in proper situations,

* *Du Pratz, Histoire de la Louisiane*, Paris, 1758, vol. i, p. 124, and vol. ii, p. 179.

† *Dumont Mémoires Historiques sur la Louisiane*, Paris, 1753, vol. ii, p. 271, &c.

‡ *Adair's History of the American Indians*, London, 1775, p. 424.

§ *Loskiel, Geschichte der Mission der evangelischen Brüder unter den Indianern in Nord-Amerika*, Barby, 1789, p. 70.

and burned to a hardness suitable to their intended uses. Another method practised by them is, to coat the inner surface of baskets made of rushes or willows with clay, to any required thickness, and when dry, to burn them as above described. In this way they construct large, handsome, and tolerably durable ware; though latterly, with such tribes as have much intercourse with the whites, it is not much used, because of the substitution of cast-iron ware in its stead."

"When these vessels are large, as is the case for the manufacture of sugar, they are suspended by grape-vines, which, wherever exposed to the fire, are constantly kept covered with moist clay. Sometimes, however, the rims are made strong, and project a little inwardly quite round the vessel so as to admit of their being sustained by flattened pieces of wood slid underneath these projections and extending across their centres."*

Lastly, I will quote here the remarks made by *Catlin* relating to the fabrication of earthenware among the Mandans. "Earthen dishes or bowls are a familiar part of the culinary furniture of every Mandan lodge, and are manufactured by the women of this tribe in great quantities, and modelled into a thousand forms and tastes. They are made from a tough black clay and baked in kilns which are made for the purpose, and are nearly equal in hardness to our own manufacture of pottery, though they have not yet got the art of glazing, which would be to them a most valuable secret. They make them so strong and serviceable, however, that they hang them over the fire, as we do our iron pots, and boil their meat in them with perfect success. I have seen some few specimens of such manufacture, which have been dug up in Indian mounds and tombs in the southern and middle States, placed in our eastern museums and looked upon as a great wonder, when here this novelty is at once done away with, and the whole mystery; where women can be seen handling and using them by hundreds, and they can be seen every day in the summer also, moulding them into many fanciful forms, and passing them through the kilns where they are hardened."†

The largest vessels made by the Indians, it seems, were those used in procuring salt by evaporation near salt springs. *Du Pratz* mentions a locality in Louisiana where the aborigines collected salt in earthen vessels made on the spot, before they had been supplied with kettles of metal by the French‡. The "Knight of Elvas" likewise describes the method of salt-making employed by the natives. "The saline below St. Genevieve, Missouri," says *Brackenridge*, "cleared out some time ago and deepened, was found to contain wagon loads of earthenware, some fragments bespeaking vessels as large as a barrel, and proving that the salines had been worked before they were known to the whites."§

I had occasion to examine a fragment of a vessel of this kind sent to Dr. Davis in 1859 by Mr. George E. Sellers, who obtained it at the salt springs near Saline river, in southern Illinois, a locality where salt was formerly made by the Indians. Several acres, Mr. Sellers states, are covered with broken vessels, and heaps of clay and shells indicate that they were made on the spot. They presented the shape of semi-globular bowls with projecting rims, and measured from thirty inches to four feet across the rim, the thickness varying from one-half to three-quarters of an inch. This earthenware had evidently been modelled in baskets. The fragment sent to Dr. Davis is a rim-piece three-quarters of an inch thick, consisting of three distinct layers of yellowish clay, mixed with very coarsely pounded shells. It is solid and heavy, and must have been tolerably well baked. The impressions on the outside are very regular

* *Hunter's Manners and Customs of several Indian tribes located west of the Mississippi*, Philadelphia, 1823, p. 296, &c.

† *Catlin's North American Indians*, London, 1848, vol. i, p. 116.

‡ *Du Pratz*, vol. i, p. 307.

§ *Brackenridge, Views of Louisiana*, Pittsburg, 1814, p. 186.

and really ornamental, proving that those aboriginal potters were also skilful basket-makers.

It would be erroneous to suppose the art of manufacturing clay vessels had been in use among *all* the tribes spread over this widely extended country; for, though exhibiting much general similarity in character and habits, they differed considerably in their attainments in the mechanical arts. This was the consequence of local circumstances, such as configuration and quality of the soil, climate, and other natural conditions which influenced, or rather determined their mode of life. Some of the North American tribes, who did not understand the fabrication of earthen vessels, were in the habit of cooking their meat in water set to boiling by means of heated stones which they put into it, the receptacles used in this operation being large wooden bowls, water-tight baskets, or even the raw hides of animals they had killed. The Assinaboins, for example, cooked in skins. "There is a very curious custom among the Assinaboins," says *Catlin*, "from which they have taken their name—a name given them by their neighbors from a singular mode they have of boiling their meat, which is done in the following manner: When they kill meat, a hole is dug in the ground about the size of a common pot, and a piece of the raw hide of the animal, as taken from the back, is put over the hole, and then pressed down with the hands close around the sides, and filled with water. The meat to be boiled is then put in this hole or pot of water; and in a fire, which is built near by, several large stones are heated to a red heat, which are successively dipped and held in the water until the meat is boiled; from which singular and peculiar custom, the Ojibways have given them the appellation of Assinaboins or Stone-boilers."

"This custom," he continues, "is a very awkward and tedious one, and used only as an ingenious means of boiling their meat, by a tribe who was too rude and ignorant to construct a kettle or pot. The traders have recently supplied these people with pots; and even long before that, the Mandans had instructed them in the secret of manufacturing very good and serviceable earthen pots, which together have entirely done away the custom, excepting at public festivals, where they seem, like all others of the human family, to take pleasure in cherishing and perpetuating their ancient customs."* Yet, the Assinaboins may, nevertheless, have been acquainted with the art of pottery; for they are a detached branch of the Dacotahs, probably of the Yankton band of that nation, and we have the testimony of *Carver*, for instance, that the Naudowessies—that is, the Dacotahs or Sioux—made "pots of clay, in which they boiled their victuals."†

Some of the tribes of New Mexico and Arizona, as, for example, the Mojaves and Pimas, still manufacture pottery; but the Pueblo Indians of those districts are especially noted for their fictile fabrics. "They manufacture, according to their aboriginal art, both for their own consumption and for the purposes of traffic, a species of earthenware not much inferior to the coarse crockery of our common potters. The pots made of this material stand fire remarkably well, and are the universal substitutes for all the purposes of cookery, even among the Mexicans, for the iron castings of this country, which are utterly unknown there. Rude as this kind of crockery is, it nevertheless evinces a great deal of skill, considering that it is made entirely without lathe or any kind of machinery. It is often fancifully painted with colored earths and the juice of a plant called *guaco*, which brightens by burning."‡

Speaking of that region, I must not omit to allude, at least, to the numerous fragments of ancient pottery which occur on the Little Colorado, Colorado Chiquito, and Gila, especially among ruins, and are often highly decorated and painted with various colors, exhibiting a style of workmanship differing from

* *Catlin*, vol. i, p. 54.

† *Carver's Travels*, London, 1781, Harper's Reprint, p. 154.

‡ *Gregg's Commerce of the Prairies*, Philadelphia, 1851, vol. i, p. 278.

and surpassing that which prevailed on the eastern side of the Rocky Mountains. Descriptions of these relics, however, would exceed the intended limits of this essay, and, moreover, they have been given elsewhere, together with speculations concerning the character of the manufacturers.*

Some years ago, while visiting northern Europe, I had occasion to see many specimens of ancient pottery deposited in the archæological collections of that district, and having previously become acquainted with the character of North American aboriginal pottery, it afforded me great pleasure to trace the similarity in the fictile manufactures of both continents. Where the external conditions of life were similar among men, their inventive powers were necessarily exerted in a similar manner. We have the testimony of *Tacitus*, that the inhabitants of Germany lived, about two thousand years ago, much in the manner of the North American Indians, before the original habits of the latter had undergone the changes resulting from their intercourse with Europeans or their descendants; and it is, therefore, quite natural that both races should have resorted to the same, or, at least, similar means to satisfy their wants. The ancient flint implements of northern Europe bear a close resemblance to those formerly made by the natives of this country, and a like conformity is exhibited in the character of their manufactures of clay.

The aborigines of North America, to recapitulate the general characteristics of their pottery, formed their vessels by hand, modelling them sometimes in baskets, and were, as far as we know, unacquainted with the art of glazing. They mixed the clay used in their pottery either with pounded shells or sand, or with pulverized silicious rocks; mica also formed sometimes a part of the composition. Their vessels were often painted with ochre, producing various shades, from a light yellow to a dark brown, or with a black color. They decorated their pottery with lines or combinations of lines and dots, and embellished it also by notching the rims, or surrounding them on the outside with studs, or in various other ways. Their vessels exhibited a great variety of forms and sizes, and many of them had rounded or convex bottoms. They hardened their earthenware in open fires or in kilns, and notwithstanding the favorable statements of some authors, it was much inferior in compactness to the common crockery manufactured at present in Europe or America, and has even, in some instances, an appearance as though it had merely been dried in the sun.

The same details, somewhat modified, are applicable to the specimens of ancient pottery preserved in the museums of northern Germany, and frequently obtained from ancient burial places, where they had been placed by the side of the dead, or as receptacles of their ashes. Many of these vessels were evidently fashioned by hand; but others, especially the larger ones, bear the unmistakable traces of the lathe, the use of which was, perhaps, known to the German tribes before they had intercourse with the Romans. The clay composing these vessels is strongly mixed with quartz sand, to which very frequently mica is added, probably with a view to impart more solidity to the mass. Ancient German clay vessels, after being exhumed, are soft and so fragile that a somewhat rough handling destroys them at once. The roots of trees and shrubs have often grown through those that are dug up in woods, which obviously shows that they were not sufficiently burned; for well-burned clay, like that composing the pipes of Roman aqueducts and the bricks of the middle age, resists humidity even better than many kinds of stone. When exposed to the air, these vessels become tolerably hard within a few hours; but in rare instances only they have that peculiar ring which characterizes well-burned earthenware. It seems, therefore, that they were not burned in kilns, but merely in strong open fires.† Many

* The reader is referred to an excellent chapter by Mr. Thomas Eubank, entitled "Illustrations of Indian Antiquities and Arts," in the third volume of *Pacific Railroad Reports*, Washington, 1856.

† *Klemm*, Germanische Alterthumskunde, Dresden, 1836, p. 167.

of the urns are painted with yellow or red earths, or a black color, the latter pigment being sulphuret of molybdenum. May not the same substance, which occurs in many localities of the United States, have been used by the Indians for blackening their pottery? An analysis would easily decide the question. The same parallel and zigzag lines, or rows of dots, which decorate Indian vessels, are also seen on the ancient pottery of the north of Europe, and of other parts of that continent. They constitute the simplest elements of ornamentation, and have, therefore, everywhere been employed by man when he made his first attempts in the art of decoration. On the surface of a few ancient vases or urns found in Germany I noticed those markings which present the appearance of basket-work; I was, however, in doubt whether they were impressions produced by the inside of baskets, or simply ornamental lines traced on the wet clay. Yet, even in the latter case, it would seem that this kind of ornamentation was suggested by the former practice of modelling vessels in baskets. I further saw some apparently very old specimens of pottery with rounded bottoms. The oldest vessels of all nations, who practised the potter's art, probably exhibited that shape, the model of which was furnished by nature in the gourd and other fruits presenting rounded outlines. A flat bottom, therefore, would denote a progress in the ceramic art. Other particular features common to the pottery of both, the ancient inhabitants of Germany and the aborigines of North America, might be pointed out; but the fictile fabrics of the former exhibit, on the whole, more elegance of outline, and therefore indicate a higher state of art. The similarity in the manufactures of men in various climates is greatest when art is in its very infancy among them. In the course of gradual development, the primitive forms common to mankind become more and more indistinct, and finally emerge into those varied and characteristic shapes which reflect the individuality of nations.

ARTIFICIAL SHELL DEPOSITS OF THE UNITED STATES.

BY D. G. BRINTON, M. D., OF WEST CHESTER, PA

IN the annual Smithsonian report for 1864, (pp. 370-374,) a description is given of an artificial shell deposit in Monmouth county, New Jersey. As this branch of American Archæology is of importance to both geologists and antiquarians, the following notes upon it may be of value to the students of each of these sciences. The exclusively artificial character of many of these deposits, even of very considerable size, was first prominently brought before the scientific public by Mr. Lardner Vanuxem, in the proceedings of the American Association of Geologists and Naturalists for 1840-'42, (pp. 21-23.) The existence of enormous accumulations of the shells of the *Ostrea virginica* and *Venus mercenaria* on the shores of the Chesapeake and its affluent streams, on the Jersey shore and Long Island, was discussed, and various proofs of their formation by the aboriginal tribes pointed out. These proofs may be briefly summed up as follows: First. Valves of the same animal are rarely found together. Second. Arrow-heads, fragments of pottery, and charcoal are mixed with the shells *in situ naturali*. Third. The shells are broken, and frequently charred. Fourth. The substratum of the deposit is the same as the surrounding soil. Fifth. The deposits are at the mouth and shores of water-courses, where the shell-fish abound. Sixth. There is an absence of stratification and older fossils.

It seems hardly necessary to adduce evidence from the old voyagers to show that in the commissariat of the native coast tribes esculent shell-fish constituted an important item. Cabeza de Vaca describes the accolents of the Gulf of Mexico as dwelling in houses of mats, "built on heaps of oyster shells," (Ramusio Viaggi, tom. III, fol. 317,) and the first settlers of Maryland record, with pleasurable recollections, the "oisters, broil'd and stewed," that the savages offered them in profusion.—(Relation of Maryland, 1634, p. 18, in Shea's Southern Tracts.)

By far the majority of these monuments of a past race are mere refuse heaps, the debris of villages of an ichthyophagous population, showing no indications of having been designedly collected in heaps, true analogues of the kjoekkenmoeddings of the age of stone; but in other instances it would appear that the Indians collected them into artificial mounds, forming a class of antiquities heretofore unnoticed by archæologists. They are found in great numbers along the southern coast, especially in Georgia and Florida, where I have examined many of them. At the landing of Fernandina, on Amelia island, the summit of the bluff is covered with a layer of artificially deposited shells, extending about two hundred yards upon the bay and one-fourth of a mile inland, varying in depth from one to four feet. The shells are in many places so rotten as to fall to pieces at the touch, some showing fractures made at the edges, as if in opening, while others have obviously been subjected to the action of fire. Charcoal, bones of fish and animals, and arrow-heads are scattered irregularly through the mass. This is the general character of many such deposits that I have examined in other parts of the peninsula of Florida; for instance, on both banks of the St. John's, at its mouth, on Anastasia island, opposite St. Augustine, on the Manatee

river, and along the shores of Tampa bay. The two most remarkable in the State are near New Smyrna, on the Mosquito lagoon, and near the mouth of the Crystal river, on the Gulf coast. Of the first of these I have a description written by a gentleman of intelligence resident on the spot, and of the second a report of an investigation made by the State geologist of Florida, Mr. F. L. Dancy, to whom I am also indebted for the former account. That near New Smyrna, called Turtle mound, is, says my informant, "thirty feet high, composed almost altogether of separate oyster shells, it being rare to find the two valves together. There are, also, conch and clam shells, both of which are, however, exceedingly scarce. That it is artificial there is no doubt on my mind. Some eight or ten years since we experienced a gale in this section of country which caused that portion of the mound facing the river, the steepest part, to fall and be washed away. Being there a few days afterwards, I took considerable pains to examine the face of it, and found, as low as the bottom and as high up as I could observe, numberless pieces of Indian pottery and quantities of bones, principally of fish, but no human ones; also charcoal and beds of ashes. The one on which I reside, opposite New Smyrna, is precisely of the same formation. Having had occasion some time back to dig a hole into it six or eight feet deep, I found precisely the same contents that I have described at Turtle mound, with the addition of some few flint arrow-heads." Of the remarkable mound on Crystal river, four miles from its mouth, Mr. Dancy writes: "The marsh of the river at that point is twenty yards wide to the firm land, at which point this mound commences to rise. It is on all sides nearly perpendicular, the faces covered with brush and trees, to which the visitors have to cling to effect an ascent. It is about forty feet in height, the top surface nearly level, about thirty feet in diameter, and covered with magnolia, live oak, and other forest trees, some of them four feet in diameter. Its form is that of a truncated cone, and, as far as can be judged from external appearance, it is composed exclusively of oyster shells and vegetable mould. These shells are all separated. The mound was evidently thrown up by the Indians for a lookout, as the gulf can be distinctly seen from its summit. There are no oysters growing at this time within four or five miles of it." This is evidently altogether different from the mere refuse heaps referred to elsewhere.

On both banks of the St. John's river, as far south as Lake Harney, the traveller finds shell bluffs, sometimes closely simulating artificial erections, quite regular in outline, not unfrequently twenty-five or thirty feet high. They are composed almost exclusively of the helix, with a few unios. The Brock House at Enterprise is built upon such a natural deposit, and south of it, between the large and small sulphur springs, some two hundred yards from the lake, there is another, and a third on the left bank, near the exit of Lake Harney, about a quarter of a mile from a very large and ancient Indian mound. The native tribes chose the shell bluffs of natural formation as favorite burial spots, and hence ancient relics are constantly found in them, but a practiced eye can readily detect the disturbance of the natural deposition of the shells. This is strikingly exemplified in the shell bluffs on Tampa bay, at the mouth of Manatee river, composed chiefly of a species of *Pyrula*. The sea face has been washed away, and the ancient graves, containing bones, charcoal, and unbroken utensils are distinctly seen cutting through the clean, original strata. On the contrary, in the refuse shell-heaps human bones are never seen, and very rarely unbroken arrow-heads or pottery.

While attached to the army of the Cumberland, during the late rebellion, I had abundant opportunity of ascertaining the prevalence of shell-heaps along the Tennessee river and its tributaries. They are very frequent at and above the Muscle Shoals, and are composed almost exclusively of the shells of the fresh-water muscle, (*Unio virginiana*, Lamarck?) Close to the famous Nick-a-jack cave is the railway station of Shellmound, so called from an uncommonly large

deposit of shells, probably left by the Cherokees, who so long used this spot as one of the headquarters of the Overhill tribes. It was taken by our troops as a military post, and embankments thrown up around the summit of the mound. The excavations made for this purpose abundantly proved its wholly artificial origin. In all instances I found the shell-heaps close to the water courses, on the rich alluvial bottom lands. The mollusks had evidently been opened by placing them on a fire. The Tennessee muscle is margaratiferous, and there is no doubt but that it was from this species that the early tribes obtained the hoards of pearls which the historians of De Soto's exploration estimated by bushels, and which were so much prized as ornaments. (See Irving, *Conquest of Florida*, p. 246.) It is still a profitable employment, the jewellers buying them at prices varying from one to fifty dollars.

The great size of some of these accumulations may furnish some conception of the length of time required for their gradual accretion, and consequently of the period during which these shores have been inhabited. That at the mouth of the Altamaha river covers ten acres of ground, and contains about 80,000 cubic yards. Many of them equal in cubical contents the largest mounds of the Ohio valley. That at the mouth of the Pickawaxent creek, eighty miles from Washington, is so considerable that a kiln was erected many years since for the purpose of burning the shells into lime, and may be still in operation. On account of their occasional very considerable magnitude, some geologists have been inclined to deny or discredit their artificial origin, and have pointed to the existence of similar deposits presenting indubitable characteristics of lacustrine and litoral formation, such as the oyster-shell heaps of southern New Jersey, (see *Second Annual Report of the Geological Survey of New Jersey*, pp. 76, 84,) and the beds of *Gnathodon cuneatus* at Mobile harbor, (*American Journal Science*, second series, vol. xi, p. 164,) but the distinctions I have pointed out will dispel any doubt upon this subject.

In estimating the comparative archæological value of these monuments of the aboriginal tribes, with a view to ascertain the amount of light they may be expected to throw on the habits and social condition of their constructors, we must place them far below the similar remains in the north of Europe. These latter reveal to us a race of whom we possess few or no other memorials, and are a principal source of information concerning nations whose very existence was forgotten; but my somewhat extended studies of this class of American antiquities convince me that they are the work of known tribes of Indians concerning whom we possess many and superior sources of information, and that they only serve to illustrate and confirm the knowledge we already have of their social status and means of subsistence.

SKETCH OF ANCIENT EARTHWORKS.

BY I. DILLE, OF OHIO.

THE archæological remains of the Mississippi valley, traced from the lakes south and southwesterly, exhibit a progressive change of structure and outline from the most simple to the most complicated. At the mouth of Chagrin river, on Lake Erie, a bold promontory is surrounded by a fosse and parapet, which were obviously intended for defence. The choice of the site and the character of the structure are such as a military leader of a rude people would be likely to adopt. From the lake to central Ohio the ancient remains are exclusively of a defensive or of a sepulchral character, and no mystery attaches to the purpose for which they were intended. Still further north, on the southern shore of Lake Superior, the working of the copper mines, with extensive explorations, leaves us in no doubt as to the object of the copper implements and ornaments found all over that country. Nothing has been observed which indicates that the makers understood the fusing of metals, or of casting them into desired forms. With the exception of the bowl of a spoon, found in the great mound at Grave creek, on the Ohio, and of doubtful origin, no useful article is known to have been made of copper by the ancient people. This metal was probably regarded as a malleable and durable stone, to which could be given any desired form by the hammer alone, and its use was ornamental, or connected with official or sacerdotal dignity.

But there is a large class of antiquities, comprising fully four-fifths of all these remains found from central Ohio southward and westward, east of the Mississippi, that we cannot refer to any purpose or use of any races of men, or of their institutions, religious, political, or social.

Of this class the ancient works in the vicinity of Newark, Ohio, are the most easterly and northerly. The great extent and variety of these works in Licking and Perry counties show clearly that this section of country contained a large and industrious population. Sepulchral mounds, differing in form and height, abound everywhere, and are especially numerous in the southeastern part of Licking and northeastern part of Perry.

The great stone mound about eight miles south of Newark, and about one mile east of the reservoir on the Licking summit of the Ohio canal, was one of the most remarkable structures in the State. It was composed of stones, in their natural shape, as they were found on the adjacent grounds, laid up, without cement, to the height of from 40 to 50 feet, upon a circular base of 182 feet diameter. This was surrounded by a low fosse, and parapet of an ovate form, with a gateway on the east end, leaving a large open area on the west end of the mound, within the enclosure. In the early settlement of this part of the State the old pioneers say this mound was a great resort for rattlesnakes; and it is told of an old woman who lived near by, that in the spring of the year she used to rake up the forest leaves around the foot of the mound, and when the weather became warm enough for the snakes to come out to bask in the sun she would set fire to the leaves, which so infuriated the snakes that they would, in their madness, rush into the fire and perish.

When the canal reservoir, which is seven or eight miles long, was made, it

was deemed necessary to protect the east bank from abrasion with stone, so that it might be used for the purposes of navigation by tow-boats. The nearest stones available for this purpose were those of the great mound. During the years 1831-'32 from 50 to 75 teams were employed in removing this mass of material. It is said that from 10,000 to 15,000 wagon loads were carried away. As the workmen approached the base of the mound they discovered 15 or 16 small earthmounds around or near the circumference of the base, and a similar one in the centre. Nothing else was noticed worthy of attention, as was then thought, and the small mounds were levelled to the ground.

No further examination was made into any of these mounds until about 1850, when some of the farmers in the vicinity devoted a part of a day to an exploration of them. They opened two which were not covered by the rubbish. In one they found human bones, with some fluviatile shells, and in the other they dug down to a hard, white fire-clay. Two or three feet below the surface of this they came to a trough similar to those formerly made in the west for feeding pigs, by hollowing out a log. This was overlaid by small logs of wood to serve as a cover, and in it was found the skeleton of a man, around which appeared the impression of a coarse cloth. Within this trough were fifteen copper rings and a breastplate of the same metal. The wood of the trough and covering was in a state of good preservation. The clay which environed it was not only impervious to air, but also to water. Satisfied with their discovery, the explorers covered up the ancient coffin, and all remained undisturbed until the summer of 1860, when the late David Wyrick, with the aid of two or three men, raised the rude coffin with its covering of logs and brought them to town. The small round logs that overlaid this sarcophagus were so well preserved that the ends showed the axe marks, and the steepness of the kerf seemed to indicate that some instrument sharper than the stone axe, found throughout the west, had been employed to cut them. The woody fibre of the coffin remained firm, but the annulars were partially separated, so as to be split apart.

In the following November Mr. Wyrick, with five other men, met at this spot and made further exploration into this mound. They found several articles of stone, among which was a stone box enclosing an engraved tablet in unknown characters; a mortar, made of the fine-grained sandstone of the country; and several neatly-worked stones, similar to a mason's plumb bob. The engraved stone has given rise to much speculation as to its origin and significance, with much division of opinion.

The central mound in the base of the large stone mound was opened in the presence of the writer of this article. A great number of human bones were found in it, but no other relics worthy of note. These bones were all deposited in, or covered by, the humus peat from the adjacent swamp, now covered by the reservoir. It is remarkable that all of those mounds which have been explored contained earth from a distance. The pipe or fire clay is found in place at Flint Ridge, six or eight miles distant, and none of that peculiar variety is known in place nearer. This ancient work we know was for burial use, but we know not what faith or what personal distinction induced the construction of a mausoleum of so much labor.

Just west of the town of Newark two confluent of the Licking river, the Raccoon and South Fork, unite, and between them is a rich valley of some thousands of acres, which is the site of the most elaborate and extensive ancient works known in the west. From the streams the land rises by natural terraces to the general level of the plain, and previous to the construction of the canal on the second alluvial bench, on the east side of the great works, was a series of low mounds, so low, indeed, that a casual observer would not suspect them to be mounds. The canal embraced these mounds in its range, and the first lock west of the town was constructed on the site of one of them. In excavating the pit for it in the spring of 1828, a deposit of human bones was discovered,

of from twelve to fifteen skeletons, upon which were laid large plates, consisting of mica of the finest quality in regard to transparency and size. Now, it is well known that no mica is found in place in the Mississippi valley, and the question arises as to where such plates as those, of from eight to ten inches in length, by from five to seven inches wide, and from one-half to one inch thick, are to be found. It is evident that they must have been brought from a great distance, perhaps hundreds of miles, and since the quantity, estimated at from twelve to twenty bushels in this place alone, was so great, the labor of transporting it could not have been trivial. It would seem that this mineral was highly esteemed by the mound builders, since many large plates of it have been ploughed up for several miles around. To what use these plates of transparent mica were put, or what superstition was connected with them, is another riddle that remains to be read.

The structure and plans of the principal ancient earthworks of the Mississippi valley have been described and delineated by Atwater, Davis, and Squier, and others; yet much remains to be done in determining the precise purposes for which they were constructed. We may assume as an obvious fact that the mound builders, in the peculiarity of every form, curve, and line of their works, had a purpose or design, but what that design was in many cases is yet to be discovered. Wise or foolish, it is locked up in the grave with its projectors, and there it will probably remain. That this people was progressive, or that the ancient works were constructed by different races having each peculiarities of their own, is evident; for, on going south, we find a change in the outlines and plans of these remains. In southern Tennessee the writer has examined several earthworks, and found that the large circular enclosures, the great squares, and the long parallel lines have given way to another class of structures. At Fort Pickering, two miles below Memphis, on a high bluff overlooking a long and graceful bend of the Mississippi, stands what the writer supposed to be an altar, which is one of the most conspicuous objects on the river. It is in the form of a parallelogram, which by stepping was found to be about two hundred and twenty feet long by one hundred and twenty feet wide, and by estimation from twenty to twenty-five feet high, with steep sides and a flat upper surface. In 1849 this mound was in a good state of preservation, and on digging into it the material of which it was composed was found to be calcined clay, changed by burning into a brick color, the clay before being burnt having evidently been mixed with the twigs of cypress, birch, and poplar, which was clearly shown by examining the fragments of charcoal under a magnifying glass.

In the vicinity of this mound were several small circles of fifteen or twenty feet diameter, some of which were circular ridges, and others were low mounds, seldom exceeding one foot in height, and flat on the top.

On the battle-field of Shiloh a great many similar right-angled, flat-topped mounds were observed, varying but little in size, form, and height. The mounds of this class are found for miles along the Tennessee river, and are very numerous near the mouth of a small stream, I think called Bear creek, which was in the very midst of one of the battle-fields of our late contest. One of these mounds is on the bank of the river, a little below the mouth of the stream just mentioned, on the side of a high bluff, which affords a fine view of the great bend of the Tennessee river. On its south side it is about seven feet above the level of the land, but situated as it is on the brow of a hill, its north side is raised from twenty-five to thirty feet above the plain below. In the course of a walk of about a mile back from the river, from twelve to fifteen mounds of this class were counted. Their general length is about sixty feet, width forty feet, and height from six to eight feet. Many of them were made the burial places of the slain who fell in the fearful contest.

As in the case of the mound at Fort Pickering, the surrounding land was marked with small circular mounds, ridges, and crescents, which were so close

to each other in some places that I could step from one to the other. No opportunity was afforded to explore any of these mounds, or to form any idea of the purpose for which they were constructed. At the village of Savannah, ten miles below, a parallelogram-shaped mound was observed, similar to those near Pittsburg Landing, and some two hundred yards to the northwest of it a very singular ancient work was noticed. Its form was that of a flattened cone, with a base in the form of a well-marked circle, having a diameter of thirty-five steps, and its apex, attained by a regular slope from all sides to the centre, was not more than three feet above the base. The writer has no means of knowing how much farther south these antiquities extend. No earth-works of any kind were seen by him in Mississippi.

Crossing the Mississippi river, ancient remains of a class and character entirely different attract our attention. The practical succeeds to the fanciful; the purpose is no longer mysterious, but obvious. The ruins of ancient towns and cities occur so frequently in travelling through southeastern Missouri and eastern Arkansas as to leave no doubt that this portion of our country was once very populous.

The sites of those ancient towns and cities are indicated by a series of little square-shaped mounds, raised above the general surface of the land but one or two feet, all ranged in straight lines in two directions, indicating that the streets crossed each other at right angles, and that every dwelling stood upon a street. To be assured that these little mounds were the remains of mud (or adobe) dwellings, several were opened, and, in turning up the earth, in every instance wood ashes and charcoal, broken pottery similar to that found on the shores of Lake Erie and throughout the Mississippi valley, flint arrow-heads, and stone axes were found. In the rainless regions of the world, the sun-burnt brick, or adobe, makes a substantial structure; but in a country of so much rain as Missouri and Arkansas adobe houses would soon moulder down to a heap, unless well protected by a roof covering. In the implements and utensils found in that country no essential difference, either in material or form, was observed, except that some earthen vessels were found entire. The marks of the hand left upon the clay when it was plastic still remained upon the vessel.

Where Fredericktown, the seat of justice of Madison county, Missouri, now stands, was also the site of a considerable city. This town occupies the dividing ridge between the waters of Castor creek and St. Francis river, which are about a mile and a half apart. Several fine and large springs of pure cold water flow out of the sides of this ridge, which, from indications, was the chief object in founding a city at this place. Among those indications is the prominent fact that nearest to the water were the largest mounds—largest not only in height but in horizontal dimensions. Some of these exceeded twenty feet square in base, while those most remote from the water did not exceed ten or twelve feet. It is evident that the chiefs, or men in authority and influence, requiring large and more commodious dwellings, settled nearer to the water, while the poor dwelt further off.

About four miles to the northwest of Fredericktown another site of a town was examined, and this was also well supplied with water, as was every one of the ancient remains which fell under the notice of the writer in Missouri.

This hasty sketch of some of the ancient remains in the Mississippi valley, though the result of the observations of a lifetime, is principally drawn from memory, and no pretension is made to exactness. As, however, the preservation of a record of the site of every mound which has been observed, and of every fact connected with it, is important to the student of archæology, this sketch, brief and imperfect as it is, may afford some data of interest in regard to the character of the race of men who once thickly peopled this country, and who have left such surprising monuments of their arts and industry.

PILE-WORK ANTIQUITIES OF OLMUTZ.

TRANSLATED FOR THE SMITHSONIAN INSTITUTION FROM THE VIENNA "WANDERER,"
JANUARY, 1865.

IN the course of last summer there were found, as is generally known, in the precincts of the city of Olmutz a variety of articles and implements of bone, stone and bronze, mingled with animal and human relics, under conditions which had till then not been observed elsewhere than in Switzerland and Denmark. The discovery was at once made public and excited great and general interest throughout Germany. Although, from the first, it was impossible to doubt that these remains belonged not to the middle ages, but to a preceding era, it could not but be felt that an opportunity was thus afforded of throwing great light upon the subject of these and similar antiquities by a detailed comparison of the discoveries made on the banks of the March with the remains of the stone and bronze ages of Switzerland. And to whom could this inquiry be referred with so much justice as to the highest authorities in this field of science, the widely known explorers of the historical antiquities of the country just named—a Keller, a Rüttimeyer, a Vogt, and others? From Zurich and Basle was first diffused a light over the primeval Celtish epoch of middle Europe, with the modes of life and industrial pursuits of its oldest postdiluvian inhabitants. In Zurich and Basle alone were to be found the materials for a comparison and identification of the various objects of primitive art as well as the animal remains of those remarkable colonies of the earlier human races. Hence, in Switzerland only could the importance of the Olmutz discoveries be rightly decided. To the proposal for a thorough and careful comparison of these with the bog and pile antiquities of Switzerland the readiest assent was yielded by the savants of the latter country, and the most liberal and zealous assistance was rendered for that purpose, above all, by Dr. Ferdinand Keller, president of the Antiquarian Society of Zurich, the first discoverer of the pile constructions, and by Professors Oswald Heer, of Zurich, L. Rüttimeyer, of Basle, Karl Vogt, of Genf, and E. Desor, of Neuenberg. To these, therefore, are due the warmest thanks of all the friends of archæology and natural science.

It will of course be readily conceived that but a small proportion of the objects as yet discovered could be submitted to the inspection of the above-named savants, while much remains to be brought to light by future explorations; but thus much may even now with certainty be said: the pre-historical antiquities of Olmutz correspond for the most part in the most exact manner with the industrial and animal remains of the pile-settlements of Switzerland. To show this, we may be allowed to communicate a few facts derived from the statements of the Swiss authorities.

A portion of the Olmutz collection pertains to the age of stone. Dr. Keller recognized, first, a stone knife; second, a hatchet of bone, precisely like those which occur in the Swiss sites, and which must have been prepared from the bones of some large animal, perhaps the ure-ox; a fragment of deer's horn, severed with a stone hatchet from the trunk; fourth, a *metacarpus* of the *Equus caballus*, polished on the anterior side and perfectly similar in this respect to several specimens from Mooscedorf, which antiquarians agree in considering as a kind of skates. (Statement of Professor Rüttimeyer, of Basle.)

The greater part, however, of the objects from the banks of the March have their origin in the age of bronze; they are such as, in the words of Dr. Keller, "belong to a very early period, which coincides with the bronze age of Switzerland, and fully correspond with the articles taken from the pile structures of that period." Among other, both entire and broken, articles of bronze, the same savant identified "a portion of a ring in which the joints of the fabrication are still to be distinguished; a piece of a needle; an ear-ring of the same form with those found in the pile buildings and burial mounds," &c.; also, "a spindle whirl, bearing the same close correspondence." Among the earthen vessels are found many fashioned apparently by no unpractised hand, and, among others, Dr. Keller describes one as "a large pot, somewhat coarsely executed, but well baked, and furnished with an uncommonly solid brim; it is more than fifty-six centimetres in width, and from the ornamentation may be assigned to a very early epoch of the bronze age." Again, a drinking-cup is described as "exactly similar to those which we often find in the burial mounds of the Helvetic era (two hundred years before and till the birth of Christ) and executed in the same style with the above."

From the communications of Professor Rüttimeyer, respecting the animal remains thus far sent to him, (another remittance has within a short time been despatched to Basle,) we learn that in the settlements on the March there existed the following animals: The wild boar, the hart, the horse, the goat, the sheep, the brachyceros, an ancient race of domestic cattle, two varieties of the dog, the tame hog, and also the extinct turf-hog (*Sus scrofa palustris*, Rüttimeyer.) Of this last the professor had before him, among other remains, a nearly perfect skull, which he describes as "differing in nothing from those of Switzerland and Italy."

Professor Oswald Heer has been kind enough to examine the cereal grains which were found mingled in the mass containing the bones of animals and men, as well as two fragments of bronze. He expresses himself as follows: "Besides the wheat, (*Triticum vulgare*,) which occurs in two forms with larger and smaller grains, we find also those of rye, (*Secale cereale*,) which had been as yet nowhere discovered in the remains either of the pile-settlements or of the Roman times. Should it prove on further research that the grains in question are in reality a product of the Roman or rather pre-Roman period, it would certainly furnish an interesting fact for the history of our cereals." This fact, however, is by no means difficult to prove, for the ancient date is satisfactorily evinced: 1st. By the two fragments of bronze found in connection with the grains and examined by Dr. Keller, one of which fragments appears to have been a portion of a large ring, probably for the neck, and the other the handle of some spoon-shaped implement. 2d. By the immediate contiguity in which the grains are found with the skull, determined by Professor Rüttimeyer to be that of the turf-hog. 3d. By the close proximity of the bones of the animal, pronounced by the same authority to belong to the ancient race of neat cattle. 4th. By the presence of a human skull, whose high antiquity it is impossible to doubt. This last relic corresponds in a surprising degree with a skull lately described by K. E. Von Baer, (Bulletin of the Petersburg Academy, *Melanges biologiques*, 1863, IV, 3,) which was taken from a burial mound of the bronze age in Zealand, and of which Von Baer had received a plaster cast from M. Thomsen, of Copenhagen. This Danish skull, which would appear to be the first belonging to the bronze period that has been obtained in Copenhagen, presents, equally with that found at Olmutz, "an extremely inclined crown—that is to say, it is considerably elevated along the median line, and sinks away rapidly on both sides. In both crania, the upper and hinder part of the head, as far as the occipital ridge, has a striking degree of projection, while the under portion, below that ridge, approximates to the horizontal. In both a cross line (querlinia) passes from one auricular opening to the other, in front of the *foramen magnum*, &c." Now as, according to Von Baer, this Danish skull of the age of bronze strikingly resem-

bles one discovered in Mecklenburg, likewise another pertaining to a skeleton found at Wiesbaden with thirteen bronze rings, and also a very ancient head from a quarry in the government of Moscow, it follows that in the bronze age, or at least at a certain period thereof, one and the same race of men inhabited the wide tract from Denmark to Moravia, and from the Rhine to the banks of the Volga.

A more detailed and complete account of these discoveries in northern Moravia is reserved for another occasion, but, from what has been here said, the importance of the explorations at Olmutz will scarcely be contested. As little will it be denied that the first proofs of the existence in eastern Europe of antiquities ascending to the times of its primitive inhabitants, under conditions similar to those of the Swiss lakes, emanated from the banks of the March.*

There can be no doubt that signal acquisitions might have been made in addition to those already realized, and which we owe wholly to the judicious encouragement afforded by a single individual from his own modest salary, had money been appropriated by authority for comprehensive excavations. Dr. Keller has expressed his conviction that it would well repay the trouble to explore carefully those points at which the antiquities appear to offer themselves in greatest abundance. The Academy of Sciences of Vienna might, it would seem, have promoted, in no slight degree, the knowledge of the primitive condition of our empire by the appropriation of means for such further explorations. This, however, it has not done, but in the interests of science it has sought to improve the discoveries at Olmutz after a different manner. More than ten years from the first detection of pile structures in the lake of Zurich by Dr. Keller, and after rapidly recurring reports of antiquarian societies since 1853, respecting the annually widening discoveries in the Swiss lakes and in Italy, when, finally, the researches of Desor had, in 1864, extended these discoveries into Bavaria, the Academy of Vienna contented itself with appropriating 1,200 florins to four persons for preliminary studies on the pile-work districts of the empire. Although several of the most distinguished members have taken the warmest interest in the discoveries made at Olmutz and their author, the Academy has pronounced against the expediency of prosecuting further researches on the March. The learned world, however, will assuredly not forget that the first inquiry respecting the existence of this interesting class of antiquities in Eastern Europe proceeded from Olmutz.

* Properly this occurred in the year 1858, at Troppau, through the discoverer of the antiquities of Olmutz. (See Year-book of the Imperial Geological Institution, XIII Band.) At Troppau were found, among other things, artificially detached horns of the *Bos priscus* and the *Bos primigenius*, under circumstances which seemed to point to a condition of human life in remote antiquity similar to that which existed in the pile-colonies of Switzerland. So we are told by the geologist, M. H. Wolf.

THE ANTIQUITIES ON THE BANKS OF THE MISSISSIPPI RIVER AND LAKE PEPIN.

BY DR. L. C. ESTES.

FOR several years I have given these mounds attention, and therefore hope that the following remarks in regard to them may be of some interest.

The questions regarding certain fortifications or mounds alleged to exist on the banks of Lake Pepin and the Mississippi river was early discussed, and now, although it is true that these remains do exist, yet eighty or ninety years have made great changes in their appearance, or else the descriptions of them furnished to us by early travellers must in a great degree be visionary. We can very easily imagine that they were once used for fortifications, but they have now scarcely any resemblance to modern forts.

These mounds are found in great numbers in various parts of the State, mostly upon the west bank of the Mississippi river. The location of them about Lake Pepin is very marked. A portion of the village of Lake City is built upon and over these remains. Between my residence and the lake there seems to have been a regularly laid out town or city. The streets are regular and the mounds equidistant from each other. In the centre of this city there was a very large mound, much larger than any of the others, which was located in the centre of the widest street, and the only one out of line. It was very probably the "headquarters," the residence of the chief, or it might have been the town hall. Nine years ago I sketched and counted these mounds. There were about one hundred of them, occupying, perhaps, a space of thirty acres.

My theory, which once differed from every other, as to the original design or use of these mounds, is now, I believe, indorsed by the State Historical Society, and by most persons who have investigated the subject. I am very well satisfied that the large and elongated mounds were designed and used for fortifications. Yet I have never been able to determine whether there were ever any ditches around them.

I am also as well satisfied that the very many round mounds found standing separate from each other were simply turf houses, in which once dwelt a people far above, in point of intelligence, the present race of savages. The common idea that these mounds were receptacles of the dead, or that each one is now or has been a sepulchre, is a theory which none have been able to maintain. I have dug into and seen many of them levelled, but never succeeded in finding human bones but in one, and those in the large mound standing in the centre of the city of mounds before described, and I am convinced that these were of more recent interment, and that they belonged to the existing race of Indians. It was a natural and convenient place in which to bury their dead.

Every investigation proves beyond a doubt, in my mind, that these works were built of turf, and that they are always composed wholly of the upper strata of soil, and that there is no perceptible depression of the earth around their base. Again, the soil in the vicinity is not found as deep as in other places, proving that it had once been removed. If these mounds were originally sepulchral in their design, then in all we should find human bones.

Just in the rear of the city of mounds, near the residence of Colonel J. T. Averill, there was a large mound, which I believe to have been a pottery, or potter's shop. Inside this mound I found numerous remains of pottery, besides large, flat smooth stones which were probably used to grind the clay. For quite a distance around this mound I found large pieces of broken pottery.

The town seems to have been well fortified, for there is, about half a mile in the rear, a regular line of out-posts, each wing extending to the lake. About midway of this line, near the residence of H. K. Terrell, the mounds are very large, either elongated or built near together. There was, beyond a doubt, the stronghold or main fort.

Again, about three-quarters of a mile still back to the west, upon an elevation of the ground, there is a group of the largest mounds I have ever seen. They are built very near together and are perfect in their form. There are no ditches about thier base, and they are wanting in other appearance of fortifications. Yet I believe them to have been used as forts, and that they were placed here to guard the approaches to the town from this direction. A few years ago some large oak trees were standing on these mounds, but I failed to ascertain their ages at the time they were cut down.

There is still another group of mounds located to the south, just below A. Dwelle's farm and near Minnow Lake. These resemble those last described—not so large, but more in number. Here again was another fort, which guarded the approaches from the south.

A PHYSICAL ATLAS OF NORTH AMERICA.

A COMMUNICATION FROM GEO. GIBBS, ESQ.

WASHINGTON, *May* 4, 1865.

My DEAR SIR: The collection by the Institution of materials for the formation of a physical atlas of the United States was among the objects contemplated by yourself in the original programme of its organization, and it appears to me that the time has now arrived when its formation should be laid on a scale commensurate in magnitude and variety of subject with the scientific progress of America, embracing all the departments of natural, physical, and social science capable of being represented in such a form, and extended in its design to the entire continent, since the boundaries of the United States are accidental and governed by none of the laws which control the operations of nature.

The completion of such a work, and its ultimate publication in a collected shape, would, of course, require years, and the expense might render assistance from Congress necessary. This, however, is a matter for future consideration. The arrangement of the materials already on hand, and what may hereafter be collected, will require but a moderate outlay and should be entered upon at once. It reflects but little credit on our national enterprise that almost the only physical charts of America should be of foreign origin.

As a necessary preliminary it is essential that good skeleton maps be prepared, and these should, in my opinion, embrace the following:

1st. A series of maps of natural geographical regions, exhibiting the hydrography of the country with minuteness, but on which only the principal mountain systems should be given, and those in curves without hachures. These maps ought not to be on one scale, for the reason that, while one certain part of the continent is comparatively destitute of interest, over large tracts of country, others crowd into a small space a great variety and even confusion of details. They should, however, be upon multiples or fractions of a common unit. As a bare suggestion I would mention scales of $\frac{1}{1200000}$ and $\frac{1}{600000}$ for these respectively. It is even probable that particular sections would require still larger ones. The districts of country to be included in these regional maps will necessarily form a subject of particular consideration. Entire hydrographical basins, as a general rule, afford the most homogeneous features, and should therefore be adopted unless other reasons interfere. In the geological series, for instance, it may be necessary sometimes to exhibit both sides of a mountain range instead of vallies bounded by water-sheds. This class of maps will be particularly adapted to natural history and the exhibition of physical phenomena.

2d. A second series, in which the same scales and topography should be used, but in which the divisions should be political, will be needed for another class of subjects, such as population, education, agriculture, and generally all those growing out of the relations of man in society.

3d. Besides these there is requisite a map of the continent on a large scale, certainly not less than $\frac{1}{3000000}$. It should include the entire arctic regions, with the eastern part of the continent of Asia and the intermediate islands, the islands of the Gulf of Mexico and the Caribbean sea, and the northern skirt of South America. This, like the first, should consist chiefly of the hydrography, giving only the chief mountain chains, or, at most, just indicating the lower water sheds. Upon it the results of the former should be generalized. Sections and profiles should, of course, accompany the maps.

As these skeletons are wanted for immediate distribution to commence new collections, as well as for the assembling and reduction of information already obtained, they should at once be lithographed, the engraving of the originals being deferred for the present. As however, lithography does not possess the requisite qualities for finished work, I would not recommend the drawing itself to be made in the first place upon stone. Certain sections of the country where the topography is already sufficiently established, might, indeed, at once and with economy be engraved. The discussion of these questions, however, will be properly referred to the officer to whom the supervision of the work is committed.

The maps designed to illustrate the natural and physical sciences, should not, at least in the first instance, exhibit political boundaries, roads, or a greater amount of nomenclature than is necessary to prevent error in location, and that should be chiefly confined to the names of rivers and natural landmarks; but the parallels and meridians should be displayed. No two subjects should, on any account, be included in any one map of either class.

It is needless here to specify all those subjects, and in fact many will doubtless hereafter suggest themselves, which would occur to no one at present. In their final shape, one set should, of course, give the topography of the continent with the utmost practicable accuracy, minutiae being however confined to those of particular sections. The map of the country west of the Mississippi, accompanying the Pacific railroad surveys, is an instance of the disadvantage of multiplying details on a general map, the most important part of it being rendered practically useless through this error. A bold and simple style of topography should be adopted for all.

On the maps being ready for distribution, each department of the government should be supplied with copies to be issued to such officers as it may designate. Contributions should be sought from the Bureau of Engineers and the Medical Bureau of the army, from the Coast Survey, the Census Bureau, that of Agriculture, of Indian Affairs and others, as well as from the National Academy of Science and learned bodies generally through the country, from expeditions and surveys, and from individuals pursuing special scientific investigations.

As the atlas is to include the whole continent, with its adjuncts, it will of course be proper to solicit co-operation in its execution not only from our own countrymen, but from Russian and British America and from Mexico. Full credit should be given in each case on the maps themselves to the source whence their contents are derived, while the Institution, as originating the work, and bearing the expenses of its preparation, reserves to itself the title of "The Smithsonian Atlas." As soon as any map or series of maps in any branch or department is completed, it may at once be published and sold at a cost sufficient to defray the expense.

The maturing of the skeleton plan in the study of projections, scales, style of topography, and the districts of country to be embraced in the regional maps, should be submitted to a single person, familiar with the surveys that have been made of the country, and at least grounded in the different natural and physical sciences. The war, now drawing to a close, will undoubtedly detach from active service a number of officers of the Engineers, including of course those formerly engaged on the surveys west of the Mississippi. A connection with a work of this magnitude and importance would naturally be an object of ambition, and I believe that its supervision by one of them would readily be permitted by the Secretary of War and by the chief of that bureau. If the United States, as we all trust, is now to enter upon a new career of mental as well as physical advancement, it becomes us to anticipate the directions in which scientific inquiry can be pushed.

I have the honor to be, very respectfully,

GEORGE GIBBS.

Professor JOSEPH HENRY,
Secretary Smithsonian Institution.

ON ETHNOLOGICAL RESEARCH.

A COMMUNICATION FROM DR. E. H. DAVIS, OF NEW YORK.

NEW YORK, *December 1, 1865.*

DEAR SIR: In your last favor, (nearly a year since,) you suggested that in case my collection went to Europe, it would be highly important that casts be taken of the most interesting objects, and inquired the cost of the same. Hearing nothing more from you on the subject, yet believing it so important to the interest of American ethnology that a suit of casts should remain here, I determined at once to complete the undertaking myself. I have accomplished it by the aid of two artists—one to mould, the other to color—completing two full sets at an expense of five hundred dollars. They have succeeded so well that it reconciles me much to the loss of the collection to this country. With these casts and contributions from the west, with Dr. Berendt's collection, which I have purchased, as well as others sent by my former students from Central and South America, I shall soon again fill up my cabinet with specimens illustrating the development of the arts on this continent.

Some years since I informed you that I was engaged in constructing an ethnological map of the United States, locating merely the mural remains. Since then I have changed my plan by locating the tribes instead of their remains, and for my own convenience have extended it to the whole continent. For instance, the great satisfaction it affords one to be able, on receiving relics from any part of the continent, to refer to a map showing the family or tribe of Indians now or formerly occupying that spot.

It is by a careful study and comparison of this kind only that we may be able to arrive at any reliable conclusions concerning the relative culture of the various tribes.

Formerly the sources for constructing such a chart were scarce and unreliable. But few travellers attempted to locate the tribes they visited, and none pretended to do so with any degree of accuracy. Adair, Carver, and some others accomplished something by accompanying their works with maps giving the names of tribes they visited, but without limits or boundaries.

Albert Gallatin was the first to construct anything like a comprehensive ethnological chart, locating, according to language, most of the tribes of North America. So far as he went, it was undoubtedly much in advance of anything down to his day. Since his time, by the philological studies of Hale and our late lamented Turner, we were able to correct some and add much to his labors. Yet the honor of completing the finest ethnological chart of America has been secured by a foreigner, the learned German anthropologist Waitz, (now dead.) He, by the aid of Gallatin, Ludwig, Turner, and a host of other authorities, has almost exhausted the subject. Still, much remains to be accomplished by local explorers, who may add new facts, or correct inevitable mistakes in a work covering so extensive a field as all America. In illustration of this remark comes the work of Manuel Orozco, "*Geografia de los Lenguas, y Carta Etnografica de México*," published last year under the auspices of Maximilian. This is a work of immense labor, continued through a long series of years, performed, too, under the disadvantage of working almost alone, cut off very much by the unsettled condition of the country from the results of co-laborers and societies

in other countries. Hence our astonishment that so much has been done, and at the same time so well done. It is accompanied by an ethnographic chart, handsomely executed, showing the geographic distribution of all the Indian tribes of Mexico. He descends much more into detail than Waitz, who gives to Mexico but a few families, while Orozco divides them into eleven distinct families of languages, leaving sixteen unclassified, and sixty-two idioms, comprising in all two hundred and seventy-six languages and seven hundred and twenty-nine tribes within the limits of that country.

Notwithstanding all this seeming minutiae and accuracy of Orozco, we find other explorers adding new light. For instance, Dr. Berendt, who, you are aware, has spent many years in that country, at the same time enjoying the rare advantage of understanding the Maya language, which enables him to add much new information, and also to correct some of the errors into which the patient Orozco has fallen.

I am now convinced that from all these sources a much better ethnological chart can be constructed than now exists—one that would reflect credit upon America. Cannot you accomplish this desirable end by calling to your aid the combined results of modern explorers, such as Berendt, Gibbs, Morgan, and others? Let them, singly or combined, contribute each their mite to the general stock, which must result in benefit to all.

* * * * Some of our army surgeons have contributed considerably to anthropology by the statistics they have collected on the measurements of the different races. But much more reliable information might have been obtained by concert of action, and by adopting a more complete and uniform system of measurements. In examining this subject, at the request of members of the Sanitary Commission, I came to the conclusion that the German method of Scherzer and Schwarz was the most scientific, yet it needs some modification to adapt it to our more practical and less patient people. I have copied it, and shall send it for your inspection, notwithstanding you may have seen it, if you have received Dr. Carl Vogt's Lectures on Man, which have been translated and published by the Anthropological Society of London.

I remain, most respectfully, yours, &c.,

E. H. DAVIS.

Professor HENRY.

TABLE OF MEASUREMENT BY SCHERZER AND SCHWARZ.

I.—GENERAL OBSERVATIONS.

[Name, sex, native country, occupation, shape and growth of beard, &c.]

	No. of the systematic series.
1. Age of the individual measured.....	1
2. Color of the hair.....	2
3. Color of eyes.....	3
4. Number of pulsations in a minute.....	4
5. Weight.....	5
6. Pressing power, (<i>force manuelle</i> ,) measured with the dynamometer of Régnier.....	6
7. Lifting power, (<i>force rénale</i> ,) measured with the dynamometer of Régnier	7
8. Total height.....	8

II.—MEASUREMENTS WITH THE PLUMMET AND METRE-SCALE.

9. Distance of the commencement of the growth of the hair on the forehead from the perpendicular.....	9
10. Distance of the root of the nose from the perpendicular.....	10

	No. of the systematic series.
11. Distance of the anterior nasal spine from the perpendicular.....	11
12. Distance of the point of the chin (mental process) from the perpendicular	12
13. Distance from the root of the nose to its tip.....	13
14. Distance from the tip of the nose to the anterior nasal spine.....	14

III.—MEASUREMENT WITH THE CALIPERS.

15. Distance from the point of the chin to the commencement of growth of hair	17
16. Distance from the point of the chin to the root of the nose.....	15
17. Distance from the point of the chin to anterior nasal spine.....	16
18. Distance from the point of the chin to the vertex.....	19
19. Distance from the point of the chin to crown of the head.....	21
20. Distance from the point of the chin to the external occipital protuberance	23
21. Distance from the point of the chin to the external auditory opening..	25
22. Distance from the point of the chin to the angle of the lower jaw.....	27
23. Distance from the root of the nose to the vertex.....	20
24. Distance from the root of the nose to the crown of the head.....	22
25. Distance from the root of the nose to the external occipital protuberance	24
26. Distance from the nasal root to the external auditory opening.....	26
27. Distance from the nasal root to the angle of the lower jaw.....	28
28. Distance from the place where the hair begins to grow to the <i>incisura</i> <i>juglaris sterni</i>	18
29. Distance from the external occipital protuberance to the seventh cervical vertebra—the measurements 28 and 29 must be taken with the head in the same position, <i>i. e.</i> , the natural one.....	56
30. Distance from one auditory opening to the other.....	30
31. Distance of the uppermost points of attachment of the ear.....	31
32. Greatest distance between the zygomata, or zygomatic arches.....	32
33. Distance between the external corners of the eyes.....	33
34. Distance between the internal corners of the eyes.....	34
35. Distance between the points of attachment of the lobes of the ear.....	35
36. Breadth of the nose.....	36
37. Breadth of the mouth.....	37
38. Distance between the angles of the lower jaw-bone.....	38
39. Distance from the seventh vertebra of the neck to the semi-lunar notch of the sternum, (<i>incisura juglaris sterni</i>)	40
40. Transverse line from one middle line of the axilla, above the <i>mammæ</i> , to the other.....	43
41. Distance from the sternum to the vertebral column.....	44
42. Distance from one anterior superior spine to the ilium of the other.....	49
43. Distance from one trochanter major to the other.....	50

IV.—MEASUREMENTS WITH THE MEASURING TAPE.

44. Circumference of the head around the external occipital protuberance..	29
45. Circumference of the neck.....	39
46. From the greater tuberosity of one humerus, in a horizontal line, to the other.....	41
47. Distance from one middle line of the axilla, above the <i>mammæ</i> , to the other.....	42
48. Circumference of the thorax at the same place.....	45
49. Distance from one nipple to the other.....	46
50. Circumference of the waist.....	47
51. From one anterior superior spine of the ilium to the other.....	48

52. Distance from the trochanter major to the anterior superior spine of the ilium, (on same side)	66
53. Distance from the most prominent part of the sternal articulation of the clavicle to the anterior spine of the ilium.....	51
54. Distance from the most prominent part of the same to the umbilicus....	52
55. Distance from the umbilicus to the upper ridge of the symphysis pubis	53
56. Distance from the fifth lumbar vertebra, along the crest of the ilium and the inguinal fossæ, to the symphysis pubis.....	54
57. Distance from the seventh vertebra to the terminal point of the os coccygis	57
58. Distance from one summum humeri, across the back, to the other....	55
59. Distance from the summum humeri to the external condyle of the humerus	58
60. Distance from the external condyle of the humerus to the styloid process of the radius across extensor side	59
61. Distance from the styloid process of the radius, across the back of the hand to the articulation of the metacarpal bone of the middle finger.	60
62. Distance from the same articulation to top of middle finger.....	61
63. Breadth of the hand.....	62
64. Greatest circumference of upper arm around the biceps.....	63
65. Greatest circumference of the fore-arm.....	64
66. Smallest circumference of the fore-arm.....	65
67. Distance from the trochanter major to the external condyle of the femur	67
68. Distance from the external connyle of the femur to the external malleolus	68
69. Distance from the inferior margin of the symphysis pubis to internal condyle of femur.....	69
70. Distance from the internal condyle of the femur to internal malleolus..	70
71. Greatest circumference of the thigh.....	71
72. Smallest circumference of the thigh.....	72
73. Circumference of the knee-joint.....	73
74. Greatest circumference of the calf.....	74
75. Smallest circumference of the lower part of the thigh above the malleoli	75
76. Length of foot.....	76
77. Circumference of foot around the instep.....	77
78. Circumference of the metatarsal joints.....	78

INTERNATIONAL ARCHÆOLOGICAL CONGRESS:

ORGANIZED BY THE ARCHÆOLOGICAL ACADEMY OF BELGIUM IN CON-
CERT WITH THE FRENCH SOCIETY OF ARCHÆOLOGY: ANTWERP, 1866.*

PROGRAMME.

ARCHÆOLOGY.—1. Do the discoveries of lacustrian habitations enable us to assign precise chronological limits to the custom which led to the erection of these constructions?

2. Do the dolmens of Ireland and Scotland modify the conclusions drawn by French archæologists from the study of monuments of the same nature existing on the coasts of Brittany and Normandy, in regard to the destination of these constructions?

3. Do the subterranean discoveries made within a few years in Denmark modify the results obtained by archæological science in the southern and central parts of Europe?

4. To what epoch may the tombs of lead be referred? By what characters can their succession be recognized?

5. Do the discoveries of antiquities made thus far in Germany enable us to determine, in a certain manner, the period during which the Romans occupied that part of Europe?

* *Regulations.*—1. The Congress will open August 12, 1866, and will terminate the 21st of the same month. 2. It will be divided into two sections, which will transact business alternately, in general assembly. 3. The central bureau, composed of four members of the committee of organization, four of the committee of administration, and six foreign delegates, will nominate, each day, for the sessions of the next, the president, vice-presidents and members of the bureau of each section. Each day, the central bureau will prescribe, for the following day, the hours of session of the sections and determine for them the order of the day, which shall not be modified. 4. The secretaries of the sections will be nominated by the central bureau, which will proclaim the names at the opening session. 5. No one shall address the Congress during a session without permission from the president. 6. All discussion respecting religion and modern politics is expressly interdicted. 7. The reading of no memoir will be permitted. This interdiction does not apply to citations which the speakers may have occasion to make in their discourses. 8. Written memoirs will be referred to the central bureau, which will judge whether they merit insertion in the *compte-rendu* of the sessions. 9. The members shall have the right of presenting other questions than those of the programme, but these must have been previously laid, during session, upon the desk. They will be examined, the same evening, by the central bureau, which will judge whether they can be admitted. The result of the deliberation will be communicated next day to the sections which they concern. 10. Scientific excursions will be in order during and after the continuance of the Congress. 11. Those persons shall be members of the Congress who, having accepted the invitation extended to them, shall have deposited in the hands of the treasurer the sum of *ten francs* for the purpose of discharging in part the expense of printing and engraving the *compte-rendu* of the labors of the session. 12. Each member of the Congress shall be entitled to receive a copy of the *compte-rendu*, which will be published under the superintendence of the general secretaries. 13. Each scientific association which shall appear by representative shall receive gratuitously a copy of the *compte-rendu*. This does not dispense with the payment by the delegates of the contribution mentioned in article 11, and which gives them personally a right to the receipt of the volume. 14. Members prevented from attending the Congress may, like others, present memoirs on the questions of the programme. 15. Representatives of the public journals will, on application to the central bureau, have a special gallery assigned to them. 16. Any difficulty not foreseen in these arrangements will be submitted to the decision of the central bureau without appeal.

6. What influence has been exerted on the arts, and especially on architecture, in the Iberian peninsula by the occupation of the Moors?

7. What state has the study of runic inscriptions attained?

8. To determine the characters of Carolingian architecture and its influence on the progress of the art of building. To explain the influence of the Normans on this art, after Charlemagne.

9. What classifications may be adopted for the discoveries made in Belgium and neighboring countries of objects anterior to the Carolingian era? Are the divisions adopted by the Abbé Cochet admissible elsewhere than in Normandy?

10. What is the true symbolical interpretation of the box or coffer, the glass or *poculum*, and the cloth *mappa*, in the funeral representations of the Gallo-Roman epoch?

11. Did the architecture of Greek temples borrow its forms from constructions in wood? A discussion of the opinion of M. Violet-Leduc on this subject.

12. Is the ogival style to be considered as the natural and complete development of the Roman style? On the contrary hypothesis, might not this last be reinstated in practice and applied to the requirements of the present age?

13. There existed in France, in the twelfth century, several schools or systems of architecture, in determinate regions. Can the same fact be recognized in Germany and the Netherlands during the eleventh and twelfth centuries? If so, what was the geographic distribution of those schools, and in what did they differ from one another?

14. What were the mechanical means employed by the primitive races in moving the immense blocks serving for the construction of dolmens, peulvans, menhirs, and structures styled halls of the *giants*? An examination should be made of the opinions pronounced on this subject. See the memoir of his Majesty Frederic VII, king of Denmark, inserted in the publications of the Society of Antiquaries of the North, (1850, 1860.)

15. What is conclusively known respecting the different kinds of horseshoes found in Gallo-Roman mines, and the manner of using them?

16. What is the point to which the study of hieroglyphics, and other modes of writing adopted by the ancient Egyptians, has attained?

17. Are the ancient heaps or mounds which exist in southern Gaul itinerary landmarks, tombs, or monuments of some other kind?

18. To ascertain the origin of the ogival style, and explain how it was introduced into the Netherlands, Germany, and England.

19. To determine the special causes which have contributed to modify the ogival style in France, England, Germany, Italy, and the Netherlands.

20. To determine by texts and respectable authorities the honorary value of the ornaments which certain representations of Roman warriors show to have been in use.

21. What degree of certainty has been attained by studies directed to the deciphering of the cuneiforms?

22. The strongholds encompassed with stones or palisades of wood, represented on the column of Trajan, evidently afford the point of departure of our feudal castles of the tenth and eleventh centuries. What documents and texts exist showing the system used in the intermediate period, that is to say, under the Merovingians and Carolingians, for abodes of opulent proprietors living in the country?

23. What rules should be adopted in the different countries of Europe: 1st, for constructing methodical archæological charts; 2d, for classifying systematically each principal epoch?

24. Should churches be made to front towards the east?

25. In churches, what is the best situation that can be given to organs and baptismal fonts?

26. Are there any modern requirements which the ogival style could not satisfy?

27. To present a view of the Anglo-Saxon antiquities brought to light by excavations made in England since the commencement of the present century. To institute a parallel between these antiquities and those of the Frankish epoch which are found in the soil of ancient Gaul.

28. To present a series of figures of feudal keeps or dungeons in western Europe at certain dates, going back to the twelfth, thirteenth, and fourteenth centuries.

29. Do there exist any certain means of distinguishing the vases of the Gauls, the Germans, the Batavians, the Britons, and the Roman or Gallo-Roman vases?

30. Are the ceramic classifications of M. Pottier, of Rouen, for the thirteenth, fourteenth, and fifteenth centuries (see the *compte-rendu* of the Scientific Congress of Rouen) accepted in England, Belgium, and Germany?

31. Where are to be found the most perfect models of Gothic civil architecture? Would it not be desirable that the monotony of modern houses should give place to ogival or Roman construction?

32. Are the white and light potteries covered externally with red lines characteristic of the thirteenth century?

33. Is the use of plaster, zinc, cast-iron, and similar materials admissible in artistic or monumental constructions?

34. What, in the different regions of Europe, has been the influence of local materials employed in ogival architecture during the middle ages?

35. A review of the art of cloth-making among the Romans as illustrated by the texts and ancient bas-reliefs which relate to this mode of industry.

36. What was the signification of the *horse* in the funeral bas-reliefs of Greece?

37. By what signs can the deceased person be recognized in ancient bas-reliefs representing death under the form of an *adieu*?

38. A compendious account of the art of the blacksmith in the second, third, and fourth centuries, with a citation of texts and the production of bas-reliefs.

39. Do the Greek temples present curves in their principal lines? A discussion of the theories of Penrose and Boetticher on this subject.

40. Is it practicable to ascertain, by facts, the epochs of the burning and burial of the dead in the Gauls?

41. Is it possible to determine the different phases of Roman civilization in the Gauls from the study of monuments and archæological discoveries?

42. What are the principles to be pursued in the restoration of ancient monuments constructed at successive epochs and in different styles?

43. What measures should be asked from the legislature to insure the preservation of historical monuments? A succinct account to be given of the legal provisions to this end which are in force in Belgium and adjacent countries.

44. To determine the age of objects in silex from their degree of elaboration.

45. To what age may we refer the instruments cut out of bone and silex in the caverns of Arriege of the provinces of Liege, Namur, &c.?

46. According to M. de Caumont the tumuli of a great part of France are not posterior to the Antonines; can this observation be generalized for the whole of ancient Gaul, or at least for the north of that country?

HISTORY.—1. An examination of the different opinions which have been recently advanced respecting the birth place of Rubens.

2. A review of the different opinions maintained respecting the true inventors of printing, with a statement of the conclusions arrived at.

3. Is it certain that America was discovered by the populations of the north of Europe before the expedition of Columbus?

4. An estimate of Charles the Bold as warrior and politician.
5. A determination of the Hellenic and the Etruscan influence on the development of the sciences and arts in primitive Rome.
6. A verification, by positive documents, of the place of birth of Godefroid de Bouillon.
7. What was the special character of the ancient Celtic, Batavian, and Gaulish divinities?
8. What were the results of the Saxon immigrations in the eighth and ninth centuries into the ancient Low Countries and the north of France? From what motives was Charlemagne led to favor them?
9. Might not archæological and historical societies, by co-operating to this end, complete in France the work of Alexis Monteil and extend its application to other countries?
10. What, in the tenth century, were the principal routes of communication in the Netherlands and the north of France?
11. What was the place of birth, or at least the nationality, of Pierre l'Hermitte?
12. Is it necessary to abandon the inquiry into the birth-place of Charlemagne?
13. A determinate geographical circumscription of the forest Charboniere?
14. An estimate of the influence exerted by the Roman legions on the propagation of Christianity among barbarous tribes.
15. Were there personages of high rank in Roman society who as early as the first and second centuries had embraced the religion of Christ?
16. What systems for the classification of historical archives have been adopted in the different countries of Europe? What is the most rational method?
17. Indicate the processes employed in the middle ages for the manufacture of stained glass windows, distinguishing the ancient workshops most renowned for the preparation of colored glass.
18. What has been the influence of Germany on the development of public law in France?
19. What were the relations of the Flemish communes with Edward the third of England on the occasion of his wars with Philip de Valois? An appreciation of Van Artevelde in reference to the Flemish policy regarding England and France.
20. What was the topography of ancient Menapia at the time of Julius Cæsar?
21. An account of the external relations of the Society of Free Merchants of London, and the treaties of commerce which it negotiated.
22. What is the present name of the localities in which were situated the endowments conferred by Goibert and his son Guntbert, endowments verified by several diplomas of the ninth century of the cartulary of the abbey of St. Bertin? (See *Cartulaire de l'Abbaye*, by M. Guerard: Paris, 1841.)
23. What are the means of determining the territorial circumscriptions of the Gaulish tribes mentioned in ancient authors?
24. What was the influence of the navigation law, under Cromwell, on the development of the English marine?
25. An account of the hydraulic labors connected with the ancient course of the Scheldt towards the sea, executed by the orders of King Otho. Did not these labors give rise to two distinct enterprises: the derivation of the Scheldt from Ghent to Boterswonde under Otho I, (941-946,) and the enlargement of the passage before Flessingen, under Otho II?
26. What has been the influence of the different modes of artistic instruction employed from the thirteenth century to our own day, upon the progress of intelligence and the civilization of the popular classes?

27. An estimate of the character of the ancient schools of painting of Liege and Tournai, and their influence on the development of the Flemish school.

28. What were the causes of the development of the fine arts in Flanders in the fourteenth and fifteenth centuries, and what was the influence of this artistic movement in France, and especially in Burgundy?

29. To what point did the religious dogmas of the Druids prepare the propagation of Christianity among the Gauls and Britons?

30. What was the origin of the Exchange (*Bourse*) in commerce?

31. Is it conclusively established that the brothers Van Eyck were the inventors of painting in oil?

32. What are the best means for awakening in the people the æsthetic sentiment? Do artistic exhibitions promise in this respect the desired effect?

33. Whence did the ancient tribes of Mexico, which, according to Aztec tradition, arrived in the twelfth century in the valley of Anahuac, derive their origin?

34. What date is to be assigned to the compilation of the first book of the Chronicles of Froissart? Distinguish in this first book what pertains properly to that historian, and indicate what he has borrowed, together with the interpolations or alterations which his work may have undergone.

35. Do the Assyrian monuments discovered up to this time, and the studies of which they have been the object, enables us to state the distinctive characters of Assyrian art, or to recognize any traces of that art in the Hellenic and Etruscan civilizations?

ON VITALITY.

BY THE REV. H. H. HIGGINS, M. A.

FROM THE PROCEEDINGS OF THE LITERARY AND PHILOSOPHICAL SOCIETY OF LIVERPOOL, ENGLAND, 1864.

THERE is at present among some very eminent physiologists a growing tendency to deny, or at all events to question, the existence of vitality as distinct from the action of known forces, such as heat, light, electricity, &c., or something analogous to these.

The views of the physiologists above referred to may thus be briefly stated:

(1.) Of the nature of vitality we know nothing; we are, therefore, not required either to admit or to deny its existence as a distinct thing.

(2.) The observed phenomena of life are consistent with, and, to a very great extent, derivable from, the operation of known laws; it is, therefore, not philosophical to introduce an entirely unknown agency to account for such residual phenomena as are not thus reducible.

The present paper will be devoted to the consideration of some questions bearing upon these two propositions.

It is a matter of comparatively little importance what term may be chosen to denote the object of our inquiry, whether it be "vitality," or "germ force," or the "vital principle," so that it be clearly understood to refer only to the ultimate element of life, and not to any even of the simplest functions of life. Seen under this aspect, vitality is simply the *sine quâ non* of the animate individual,* whose very existence, as such, stands or falls as vitality is, or is not, regarded as a distinct entity. Personality, which is a higher form of individuality, is equally dependent on the question whether vitality is, or is not, the result of forces such as we are accustomed to deal with in scientific investigations. It would be absurd to call a flame a person or an individual; yet it has active qualities, a distinct form, requires aliment, &c. A man is not a person because he has these properties, but because he has a something which a flame has not. Whether this something be designated soul, or spirit, or will, or intellect, or vitality, is, I apprehend, all the same in respect of its relation to physical science, which cannot recognize metaphysical distinctions. In fact, it is the question before us, whether on grounds of physical science we are competent to recognize vitality under any aspect as a distinct thing.

It must be evident that if the vital functions by which man is distinguished from a block of granite be the result of difference in the combination of the primary molecular forces of his living substance, he has no more right to be regarded as a person than has a thunder-storm; his being is a process, and in general terms he may be described as a segregation of certain forces, initiated by a similar combination, and passing away into equilibrium, or into the general stock from whence he was derived.

* In assigning this position to vitality the writer is aware of the difficulties which beset the subject, especially in connection with the development of plants, and in respect of the lower forms in the animal kingdom, compound animals, the alternation of generations, &c. If, however, vitality can be shown to lie beyond the range of scientific investigation, in all these cases the knot is cut; and while physical development remains in every instance a proper object of scientific inquiry, neither the relations subsisting between the vitality of a seed and that of the parent plant, nor any similar relations, can adequately be discussed as matters pertaining to natural science.

The issue, however, must be tried, not on its consequences, but on its scientific merits; on which grounds, as I apprehend, whatever may be demonstrated concerning the vitality of man holds equally good with reference to the life of a monad, or of a particle of red snow. Still, if it can be shown on purely physical principles that vitality is a something which is not analogous to the actions of known forces, then life is, to all intents and purposes, a miracle, by which I understand not the action of a power in opposition to or thwarting the physical laws of nature, but the manifestation of an agency extra-cosmical, working harmoniously with, and by means of, those laws.

It may seem to some hardly worth the while to contend for the possession by man of a distinct vitality, if by this term is meant only that which he must hold in common with an animalcule or a seed. But a moment's reflection will make it plain how vast a step is taken if we gain from physical science the admission that her kingdom is not universal. None will be more ready than the man of science to confess how little is that which is known when compared with that which remains to be known; nevertheless he is becoming more and more inclined to be convinced that all is *knowable*, and, if known, would be found conformable in all respects with the knowledge that he has already. Now, if it can be shown that vitality, even in a vegetable cell, is a thing which lies beyond the cope of physical investigation, the spell is broken, and a claim is established for the determination of what may or may not constitute the higher faculties of man on other grounds than those of physical science alone.

As a believer in something more than natural science, it is proper for me to state that I do not think a rational persuasion of the personality of man must rest upon evidence to be obtained from physical researches. Still I should expect to find in physical science some indication of its own limits, and of the commencement of that border land which separates the known from the unknown. More than this the very nature of the case forbids.

We may now proceed to the consideration of the two propositions given at the commencement of this paper as expressing the views of certain physiologists who decline to recognize in vitality anything beyond the operation of forces amenable to physical investigation.

It will be observed at the outset that much stress is laid upon the absence of all knowledge respecting the *nature* of vitality. This limitation is needful, because to say that nothing is known of its effects would simply be to anticipate the decision of the question at issue. But it may at once be admitted that we know nothing of the nature of vitality. How should we, if it has no analogy with any of the known forces? For, on this supposition, in what form could knowledge of vitality hold its place in our minds? Not in any of the old familiar forms, such as predicates respecting its quantity, intensity, polarity, and the like; for the thing thus known would have analogy with known forces, and would not be a thing *sui generis*, but would fall naturally into some recognized category. We have to give our reasons for concluding that certain observed facts imply the existence of an agency quite unlike any of the forces known to us. The reply that we know nothing of the nature of such an agency is certainly no disparagement to our hypothesis, unless it may be shown that nothing can exist of which we do not know the nature. If, then, we are at liberty to make the supposition that vitality is a thing *sui generis*, that we know nothing of its nature tells neither for nor against the probability of its existence.

One of the broadest generalizations deducible from the immense additions recently made to the ascertained truths of science is, that numberless things previously supposed to be distinct are now found to be so closely related that it is impossible to draw a line of separation between them. This has been the case alike with things organic and inorganic. The great kingdoms of animal and vegetable life pass quite imperceptibly the one into the other; and in both kingdoms the number of classes, orders, families, genera, and species that show the

same tendency is so great that where an isolated group is found it is thought to be probable that the links of connection are missing only because they are extinct, or are not yet discovered.

It is important for our purpose to notice the manner in which one group of living things passes into another. It will generally be found that the transition is not effected by the shading off or blending of the extreme edges of the groups, but by a kind of interlocking of the one into the other. The junction often resembles that of the sea and the land on the coast of Norway, where in many places it is hard to say whether it is the sea that runs far into the land or the land that runs far into the sea. Thus, judged by one set of characters, an organic form may not only be a vegetable, but even hold a somewhat high place in the vegetable kingdom, while, judged by another set of characters, the same creature may not only be an animal, but have its place by no means on the confines of the animal kingdom.

Discoveries relating to the allotropic forms of matter and the correlation of the imponderable forces warrant the same conclusion as to the close affinity subsisting between inorganic things.

In fact, that "nature does not proceed by a leap" might seem to be a rule that lacks the criterion of an exception; yet there is an exception, and a striking one, limits have given way in all directions, yet there is one that stands out as sharply and as distinctly as ever—that, namely, which divides animated things from those which are inanimate. No form of matter that is not animate exhibits anything approaching to the phenomena of life. Of course, none but a superficial observer would suggest the process of crystallization, or the dendritic appearances of some metals, or the moss-like forms seen in agates, as exceptions. Neither can any instance of a degradation towards the character of inorganic matter be found in the very lowest forms of life, in the protozoa, or the sponges, or the nullipores, or the fungi, the algæ, the confervæ, or even in the single living vegetable cell.

Now, if the vital principle be analogous to any known form of matter or force, this solitary case of a great leap taken by nature is incongruous with all that we know of her other proceedings. If, indeed, the presence of life indicates the introduction of something entirely new, then we have a reason for the leap. But if not, the facts we have considered appear to be inconsistent with the hiatus between animate and inanimate things. If life be made up of forces similar to those which act in various ways both on organic and on inorganic matter, we might expect to find the transition from things inanimate to things animate the same in character with all other transitions in nature; the border land would be occupied with semi-animate materials and semi-mineral vegetables or animals, with instances of equivocal life and products of doubtful organization. Whereas, from the highest to the very lowest organism, even to the primordial utricle and cell, the phenomena of life are distinct and unquestionable. It is true that geologists have to deal with certain forms of doubtful organization found in the lowest rocks, but in these instances the difficulty arises from the changes through which the fossils have passed. There may be reason to doubt whether certain appearances truly indicate organic remains; but there is nothing to indicate that life, in the Silurian ages, was less distinct than it is now.

The above argument for the specialty of the vital principle, derived from the unparalleled solution of continuity in nature just at the point where life commences, demands for its full illustration rather a volume than a mere notice in a brief paper. Its force, if it have any, is evidently acquired from facts revealed by the very researches which have led some to form an opposite conclusion.

Again, if vitality is analogous to, or correlative with, the known forces, we might expect to find at all events some resemblance existing between their respective properties and modes of action. Now the results of the action of heat,

electricity, chemical affinity, &c., on various forms of matter have been much studied, and a good deal is known about them. Yet among all these results no single instance can be found resembling the commencement of the functions of vitality. It is, however, admitted that from the outset the vital principle works harmoniously with and by means of the known forces; so that much of that which was wont to be ascribed to vital force is now known to be a chemical process brought about by the agency of light and heat. But the question is not what light, heat, &c., and vitality can do conjointly, but what light, heat, &c., can do without the presence of vitality; and the reply must, I think, be unfavorable to the correlation which is supposed to exist between vitality and the known forces.

It may be replied that none of the imponderable forces has ever been alleged to be the force of life; yet if the latter force is correlative with any of the former, could it behave so differently? For example, the known forces act universally; there is no kind of matter that is not at all times affected by heat, light, electricity, and chemical affinity; on the other hand, the force of life stops suddenly and definitely at a limit which excludes a large proportion of existing matter.

We may now pass again to the alternative. If vitality be not *sui generis*, it must be something analogous to the agencies with which we are acquainted. Now of these agents collectively the *most certain thing* that we can say is, that they are strictly obedient to fixed laws; that under similar circumstances similar results invariably follow. So precise and constant is the operation of this rule that, under favorable conditions, we are able to infer the antecedent from the knowledge of the effect, with as much accuracy as we can predict the effect from the knowledge of the antecedent. We are quite certain that no portion of a result, however minute, can have been produced without a corresponding character having existed in the antecedent. It is not contended that we are able to trace otherwise than very imperfectly the remoter antecedents of the facts observed in inanimate nature, but we are convinced that everywhere the supremacy of law is absolute.

If, for example, we could trace the history of a drop of water which trickles down the window pane, we should find that its volume, its direction, its temperature, and all its other characters were derived from atmospheric and other agencies; and if the history of the drop could be submitted to a suitable kind of examination, it would yield up to us the exact qualitative and quantitative characters of all the forces which had collected it and sent it on its course. These forces would indicate their antecedents, till it might be seen that our drop was the inevitable and exact result of meteorological and chemical and mechanical changes and actions that had been going on continuously from the Silurian ages, and for we know not how long previously.

Nor would the whole history of the drop, however remote its starting point, present any very complicated or difficult facts. Some of its particles may have come from the antipodes, or have belonged to the polar snows; others, in a state of decomposition, may have assisted to lift a balloon or have been breathed by an ichthyosaurus, yet they were never for an instant beyond the grasp of those known laws which in the end brought them together to be a drop; every step in the whole course being, with the utmost precision, dependent upon the previous one.

Those who do not admit the vital principle to be a thing *sui generis* must assign to it a place under the dominion of laws, the rigorous character of the operations of which I have endeavored to illustrate.* If the consequence of such an allocation can be shown to be difficulties unparalleled in magnitude, something will be done towards proving that the allocation is a wrong one, and that the vital principle is a thing not subject to the laws of ordinary forces.

* Be it remembered, once for all, that on this point there can be no playing fast or loose to suit the occasion. Vitality is, or is not, subject to the exact laws of nature.

Such difficulties arise in various directions when we begin to apply the laws which govern things inanimate to the phenomena of life.

It is well known that the common hydra may be reproduced by a small portion of its body severed from the rest, or even by a portion of one of its tentacles. On the supposition that known forces, or forces analogous to these, are alone concerned in this reproduction, it follows that in the severed portion must have existed physical peculiarities corresponding with *every part* of the entire animal; or, in other words, that the prototype of the perfect form to be evolved must have been in the particle capable of being thus developed; for known forces have no specific predilections of this kind, and except the bit contained that which could initiate the development in a particular direction, there is no conceivable reason why these forces should develop it into a hydra more than into an amœba or a rotifer.

On similar grounds the seed must contain the perfect initium of the future plant to its most minute organs. The color spot on the petal of a pelargonium could in no conceivable way have been produced through the agencies of chemical affinities, heat, electricity, and the like, except from the existence of some corresponding physical starting point in the seed. This is admitted by some who question the existence of a vital principle.

On the other hand, it may freely be admitted that if this wonderfully complicated structure did exist in the seed, it is by no means certain that we should be able to discover any traces of it. Our being unable to find it is no proof that it may not be there, unless we can show that in our investigation of the seed we have detected the ultimate forms of matter.

Here it is important to define what is meant by the existence, in the embryo prototype, of a structure corresponding in all respects with the future animal or plant to be developed. It is not contended that in the seed, for instance, the prototype must fix in every respect the form and dimensions of the future plant; for in the course of growth the plant is submitted to the variable influences of heat and moisture and light, and these will affect its ultimate condition, or it may suffer distortion from the attacks of insects or from mechanical pressure. Still, under all these possible influences, every portion, every fibre of the living plant will be what it would not have been but from some peculiar character in the seed which initiated its production.

There is not a leaf on an oak tree but must have had its own share in the acorn from which the tree sprang. For let us remember we are trying the consequences of the utter exclusion of a vital principle as a special thing; we have only to do with the results of the actions of known forces, which have no more tendency to produce a leaf than to produce an animal, except from the direction given to their energies by the original initium. In the action of these forces the result indicates the antecedent as much as the antecedent the result. It matters not how many steps backward we have to go. The leaf takes its character from the bud, not, let us remember, by the influence of a vital force, but by a process of development brought about by heat, electricity, light, moisture, carbonic acid, &c., acting on the bud. Then, I submit, the leaf in all its parts, down to its veins and stomata, must have been initiated by some special physical character in the bud. What have heat, electricity, &c., to do with forming veins and stomata? Given the proper nucleus, these forces are quite competent to develop any number of organs, but no particle of the leaf must fail of having had its type in the bud, else, instead of that particle, there would have been an hiatus, or something of a different kind.

The bud imposes the same conditions on the twig; but, in fact, the conditions multiply as we recede, for the twig has to furnish the starting points for the bud and all its leaves; the twig, in like manner, looks back to the bough, till, by the time we arrive at the acorn, it is useless to attempt to burden the mind with thinking of all its little shell must contain. Yet we have only gone back

a single generation. That acorn was itself borne on an oak, which sprang from an acorn; which must have held the type of the types in the second acorn, and of every leaf of the tree which the second acorn produced. In fact, if we conceive the oaks of the world to have sprung from a single acorn, on the hypothesis of those who deny the specialty of the vital principle, that acorn must have had in itself the types of all the oaks that have ever been produced; for agencies like those of electricity, heat, &c., can only work upon what they find; and if there should be a bud on the last oak that had not its representative in the first acorn, that bud would be a result without a corresponding antecedent.

Let us remark that the difficulty we here encounter arises from the peculiar manner in which life is transmitted from living things to their successors. No difficulties of this kind meet us in the history of the drop of water, though we saw that it had a history reaching back to the very limits of time. Its particles may have been many times round the world; some of its parts may have been ice, or steam, or free oxygen and hydrogen. The changes they may have passed through quite exceed our calculation, but they were either chemical or mechanical; and though the series is long, the terms are simple—there is no accumulation of difficulty. In the case of crystals the nucleus is the requisite initium, or rather the molecules of the mineral substance have characters sufficient to determine the form of the crystal. But the crystal is homogeneous, and has no special organs such as are possessed by plants and animals. The production of such an organ as the eye from the mere development of physical peculiarities pertaining to the germinal vesicle and spot can hardly be conceived to be possible.

In fact, the notion that every seed contained the perfect plant in miniature belonged to a former age, and has long been regarded as exploded; yet it seems to me to be an inevitable conclusion if nothing is concerned in the germination and subsequent growth of the seed but such as are of the nature of light, heat, electricity, &c. It is, however, certain that the seed possesses vitality; and without attempting to define what the vital principle may be, it appears reasonable to assign to it a certain special directive agency, by virtue of which it is enabled to apply the ever-present forces of heat, actinism, &c., in the construction of a plant of its own proper species. But it is manifest that a vitality thus endued cannot be correlative with any of the known imponderable forces.

Another point worthy of attention is the stability of form and structure observable through many generations of the same species. Whatever may be the wondrous exactness of the embryo prototype, the accidental influences of heat, moisture, light, &c., in the course of growth are so great that it is hardly possible to conceive that, with *only* the physical character of the embryo (itself produced under these varying agencies) to determine the succeeding form, similarity should be preserved through so many ages and in so many collateral lines of descent.

The termination of life, on the supposition that the vital principle is analogous to known forces, ought to yield indications of some kind or other. Death is a common event, and one that lies completely open to observations of all kinds. In the animal world it is in our power to produce death under almost any conditions we may choose as most favorable for investigation; and it is an event so interesting that the discovery of its nature would be considered the greatest achievement of the intellect of man; yet the nature of death is absolutely unknown. The most delicate tests for indicating minute changes in electrical, thermal, and other conditions have been applied at the moment of death, and have shown no sign. Now it is certain of the forces of heat, light, motion, &c., that they are absolutely indestructible; they may be converted one into another, but they cannot cease to exist. If the vital principle was analogous to these agencies it might escape in any one of them; but of this no well-ascertained trace has been observed in any investigation of the phenomena of death.

The uniformity of the period through which life extends in any given species is a result that no one would anticipate if the vital principle be of the nature of the known forces. The physical elements of animals are said to undergo an entire renewal in the course of a few years. Surely, then, with renewed materials to work upon, and with something akin to the imponderables to do the work, animals should never grow old. Why should they—any more than oxygen should lose its vigor and grow tired of uniting with hydrogen?

We have now noticed some of the considerations which appear to favor the supposition that the vital principle is a thing *sui generis*:

1st. The unparalleled hiatus which exists between things animate and things inanimate.

2d. The great dissimilarity between the properties of the imponderables and those of vitality.

3d. The difficulty arising from the hypothesis that the embryo of a living thing is developed only by agencies analogous with known forces.

4th. The permanence of form and structure observable during many generations of the same species.

5th. The absence of any indications as to what becomes of the vital principle at death.

6th. The periodicity of life.

It is not contended that these considerations amount to a demonstrative proof that the vital principle is a thing *sui generis*, but the question naturally arises, how far, supposing our conclusion to be a right one, a demonstrative proof is possible.

An instance somewhat parallel may be found in the field of natural theology, in which is assumed, as a starting point, the existence of a first Supreme Cause, whose nature is beyond all comprehension; certain facts are adduced which agree with this assumption; also, its rejection is shown to involve many great difficulties; but all this is not proof; and in fact proof here seems to be out of the question, for the simple reason that whatever *that* might be of which the existence could be proved, it would not be the Infinite One. In logic, as in mechanics, action and reaction are equal, and the very *locus standi* required by a proof, in the thing to be proved, puts demonstration in this case out of the question. Similarly, if the existence of vitality as a distinct thing were capable of being demonstrated by direct proof, the vital principle must be of the nature of other agencies, which is contrary to the original hypothesis.

It would be very interesting to trace the course of those discoveries in physiology which have led some eminent observers to class vitality with other known forces. It cannot be denied that a very large number of facts connected with the phenomena of life, formerly supposed to be attributable only to the undefined agency of the vital principle, are now accounted for on principles which are purely scientific. For example: the constituents of some of the proximate elements of organic substances, such as starch, albumen, &c., were known long ago; but the power to combine these constituents so as to produce the proximate elements was regarded as being possessed by the vital principle alone, the working of which in the formation of the proximate elements could, it was thought, by no means be imitated in the laboratory. This is now known to be an error; the chemist by his science does that which before was considered to be the peculiar function of the vital principle. In these and many other instances it has been proved that the aid of the vital principle has been unnecessarily invoked to account for results explicable on scientific grounds.

In all this we have a parallel to that which has taken place in the more extensive field of the cosmos. Yet there are some who are conscious that if it were possible to trace the existing state of things by a regular series of scientific deductions to a nebular condition of the universe, no approach would be made thereby to the possibility of dispensing with a first Supreme Cause.

It is, however, abundantly evident that the great Originator of nature has chosen to accomplish His purpose by a wondrous succession of fixed laws, open to our investigation, and revealing depth beyond depth to a most remote and obscure profundity.

With this fact before us, on the hypothesis that the force of life, like its Author, possesses an unknown, perhaps an unknowable nature, we should not expect its interposition to be conspicuous; we should, I think, expect its agency to be executed only behind a succession of fixed laws, forming a vista, having its termination almost lost in the distance. The natural evidence in the two cases must of necessity, as we have seen, be of the same character, not direct or demonstrative, but implied and inferential.

Whatever weight may be due to the considerations here urged in favor of the specialty of the vital principle, at all events they answer these expectations and conditions. Those arguments on which most stress has been laid arise at points where, if evidence be possible, any one who thinks at all on the subject would expect to find it. Something altogether unusual in nature marks the boundary of the province in which life-force prevails; and the phenomena of life do not submit to be accounted for under the rigid laws which govern the application of all forces that are known.

APPENDIX.

BY THE SECRETARY.

In the early study of mechanical and physiological phenomena, the energy which was exhibited by animals, or, in other words, their power to perform what is technically called work, that is to overcome the inertia and change the form of matter, was referred to the vital force. A more critical study of these phenomena has, however, shown that this energy results from the mechanical power stored away in the food and materials which the body consumes; that the body is a machine for applying and modifying power, precisely similar to those machines invented by man for a similar purpose. Indeed, it has been shown by accurate experiments that the amount of energy developed in animal exertion is just in proportion to the material consumed. To give a more definite idea of this, we may state the general fact that matter may be considered under two aspects, namely, matter in a condition of power, and matter in a state of entire inertness. For example, the weight of a clock or the spring of a watch when wound up is in a state of power, and in its running down gives out, tick by tick, an amount of power precisely equal to the muscular energy expended in winding it up. When the weight or the spring has run down, it is then in a condition of inertness, and will continue in this state, incapable of producing motion, unless it be again put in a condition of power by the application of an extraneous force. Again, coal and other combustible bodies consist of matter in a condition of power, and in their running down into carbonic acid and water, during their combustion, evolve the energy exhibited in the operations of the steam engine. The combustible material may be considered the food of the steam engine, and experiments have been made to ascertain the relative economy in the expenditure of a definite amount of food in the natural machine and the artificial engine. The former has been found to waste less of the motive power than the latter.

In pursuing this train of investigation the question is asked, "Whence does the coal or food derive its power?" The answer is, that these substances are

derived from the air by the decomposing agency of the impulses from the sun, and that when burned in the engine or consumed in the body they are again resolved into air, giving out in this resolution an amount of energy equivalent to that received from the sun during the process of their growth. All the materials of the crust of the earth, with the exception of coal and organic matter, are in a state of inertness, and, like the burnt slag of the furnace, have expended their energy, and in this condition of inertness they would forever remain, were it not for extraneous influences, principally the sun.

From this point of view the phenomena we have been considering consist merely in the transfer of power from one body to another, and from a wide generalization from all the facts the conclusion has been arrived at that energy is neither lost nor gained in the transfer; and, pursuing the same train of reflection, we are finally led to the result that all power is derived from the primordial, unbalanced attraction and repulsion of the atoms of matter.

In the gradual development of the principles we have given there has been a tendency to extend the views we have presented too far, and to refer all the phenomena of life to the mechanical or chemical forces of nature. Although it has been, as we think, conclusively proved that from food, and food alone, come all the different kinds of physical force which are manifest in animal life, yet, as the author of the preceding paper has shown, there is something else necessary to life, and this something, though it cannot properly be called a force, may be denominated the vital principle. Without the influence of this principle the undirected physical powers produce mechanical arrangements and assume a state of permanent equilibrium by bringing matter into crystalline forms or into a condition of simple aggregation, while under its mysterious influence the particles of matter are built up into an unstable condition in the form of organic molecules. While, therefore, we may refer the changes which are here produced, or, in other words, the work performed, to the expenditure of the physical powers of heat, chemical action, &c., we must admit the necessity of something beyond these, which, from the analogy with mental phenomena, we may denominate the directing principle. Although we cannot perhaps positively say in the present state of science that this directing principle will not manifest itself when all the necessary conditions are present, yet in the ordinary phenomena of life which are everywhere exhibited around us, organization is derived from vitality and not vitality from organization. That the vital or directing principle is not a physical power which performs work, or that it cannot be classed with heat or chemical action, is evident from the fact that it may be indefinitely extended—from a single acorn a whole forest of oaks may result.

The principles of which we have here endeavored to give an exposition are strikingly illustrated in the transformation of the egg when subjected to a slightly elevated temperature. The egg of a bird, for example, as we know, consists of a congeries of organized molecules or vesicles, enclosed in a calcareous shell, thickly punctured with minute holes, through which the oxygen of the air can enter, and vapors and gases escape. Let us observe the difference of changes which take place in two newly-laid eggs, one of which is not possessed with vitality, and the other is endowed with this mysterious principle. Both of these eggs are in a condition of power, the carbon, hydrogen, nitrogen, sulphur, &c., of which their organized molecules are composed, are in a state of unstable equilibrium, and ready, when set in motion by a slight increase of temperature, to rush into the more stable compounds of carbonic acid, vapor of water, &c., by chemical attraction. While the eggs are in an unchanged condition they possess the same amount of what is called potential energy, which in both cases will be expended in the transformation of the materials; but how different will be the effects produced. In the case of the egg deprived of vitality, all the organized molecules will be converted into gases and vapors, with the development of heat and an elastic energy, in some cases sufficient to burst the shell, the power

originally stored away in the egg being thus dissipated in the production of chemical and mechanical changes. In the case of the egg possessed of vitality, a portion of the organized molecules will also run down into vapors and gases, which will gradually escape through the perforations of the shell, and will thus, as in the previous case, evolve an equivalent amount of power; but this, instead of being dissipated in mere mechanical or chemical effects, will be expended, under the directing principle of vitality, in elevating to a higher degree of organization the molecules of the remainder, and in transforming them into organs of sensation, perception, and locomotion; in short, in the production of a machine precisely similar to those constructed by the intellectual operations of man when guiding or directing the powers of nature. If we examine the transformation as it goes on from day to day, we shall see that it does not consist in a simple aggregation of particles in the production of the organs we have mentioned, but in preliminary arrangements, such as canals, and provisional, afterwards to be obliterated, and the adoption of means for a more remote end, the whole indicating an intention realized in the sentient, living, moving animal.

This vital principle, from strict analogy, cannot be considered as an essential property of matter, since it is only continued by transmission from one living being to another. It is true that it ceases to manifest itself when a slight derangement takes place in the organized material with which it is connected, and death ensues; but this is precisely analogous to the manifestation of the thinking, willing principle within us, the existence of which is revealed to us by our own consciousness as a primordial truth, beyond which nothing can be more certain.

INSTRUCTIONS FOR COLLECTING LAND AND FRESH-WATER SHELLS.

BY DR. JAMES LEWIS, OF MOHAWK, N. Y.

Explorations.—Before the collector can enter the field with much certainty as to the anticipated result of his labors, it may be necessary for him to satisfy himself that there are in the district about him shells enough to offer encouragement. It will be found, generally, that those sections of the country that have a dry sandy soil are unfavorable for the production of molluscs. Regions in which pines abound are proverbially of this character, and here the efforts of the collector are usually but indifferently rewarded. In the moist alluvial soils of limestone formations are found the most favorable conditions for the production of molluscs. This is more notably true with regard to land shells; aquatic species are also affected similarly, but less conspicuously, by the character of the soil. But it will almost invariably be observed that waters deficient in lime do not produce shells as perfect nor in as great numbers as waters charged with this earth.

Land shells.—With a few exceptions, relating to some of the smaller species, and also a few species of semi-aquatic habits, the land shells of this country are found most abundantly in the wooded alluvial regions, where during the day they are concealed under fragments of fallen trees, bits of bark, chips, &c., sometimes concealed under leaves or in the tufts of rank growths of moss. Some species will be occasionally found in the moist debris of shaly rocks in ravines. Species peculiar to the southern States are sometimes met with on shrubs and trees. But few species living in the northern or central portions of the country are often so found. Some species of semi-aquatic habits, though occasionally seen on the rank vegetation along rivers, (sometimes several feet from the ground,) are more frequently observed under bits of flood wood, leaves, &c., near the muddy slopes of streams or ponds, or in the vicinity of water, where they may find concealment either in grass or under the shade of aquatic plants.

Among our most minute species are those that delight in wet grass lands, or in localities that are usually moist during a very considerable portion of the year. They are sometimes found in such localities congregated in hundreds under stray fragments of boards, bits of wood, &c.

As different sections of the country offer constantly varying conditions affecting the habits of land shells, it may be expected that some species that usually are found in such stations as have just been indicated may in exceptional instances be found under circumstances where the collector might least expect to discover them. It accordingly becomes the collector to be at all times on the alert, and to inspect every variety of station. By doing so, he will often unexpectedly discover desirable species, and acquire information respecting their habits, of more value to him than any suggestions that might be conveyed to him by a volume of printed instructions.

As examples it may be stated that in and around dilapidated buildings, where fragments of bricks and mortar cover the ground, large numbers of the smaller species of *Helix*, *Pupa*, *Carychum*, &c., will be found. They adhere to the under surface of a porous brick in preference to a fragment of gneiss, limestone, or other rock. Also the cavity of a decayed tree or stump, when examined in the

early days of spring, will reward the searcher abundantly. Rich harvest may also be frequently gathered by laying boards upon the grass or ground, wetting them previously, unless immediately after a rain. On taking them up after a night's exposure large numbers of shells will often be found attached to the under surface.

Fresh-water shells.—While searching for those species of land shells that are found usually near water the collector will often have his attention drawn to air-breathing molluscs that are properly designated aquatic mollusca. The habits of some species of this class are such that by one unacquainted with them they might be confounded with land shells. Many of these species have a habit of crawling out of the water, remaining on the moist mud without inconvenience. They will also sometimes be found on the stems and leaves of aquatic plants, or on other projecting substances several inches from the surface of the water. In their habits as a class they are adapted to a wide range of conditions, so that they will be found in lakes, ponds, rivers, canals, ditches, stagnant pools, swamps, and small rivulets, though some species seem to be adapted to a narrow range of conditions; the class, however, has its representatives over the whole continent. Though by far the greater number of species of molluscs belonging to this class prefer shallow water, feeding on the vegetation that abounds in such stations, there are a few exceptions in which species are found adapted to deep water, in which it is improbable they can reach the surface to respire the air. The collector will find many species accessible to him along the margins of water. Others will require the aid of a boat, especially such as are found feeding on the weeds in lakes and rivers. To discover some of the minute species found under such circumstances it may sometimes be advantageous to gather handfuls of the weeds and gently lift them out of the water. If the operation be rudely performed, the molluscs may be disturbed so as to detach themselves. Many species will be found adhering to the grass-like plants that grow in streams. Others adhere to the stems of flag and bullrush, and may be discovered very readily by pulling up the plants by the roots, taking care to perform the operation gently and deliberately. Of analogous habits with some of the above are certain small species found concealed under stones just below low-water mark in rivers. They are sometimes also found adhering to larger shells. This class embraces only small cup-like shells—"fresh-water limpets."

Aside from the air-breathing aquatic molluscs, we have others whose respiration is aquatic. The necessities of the respiration of the water-breathing molluscs restricts them to a narrower range of circumstances than those to which the air-breathing molluscs can conform. Hence they are not usually found in stagnant waters—certainly not in waters of limited area, where impurities are generated by decomposing substances. The largest shells of this class are found in the swamps along the rivers of some of the southern States, and are objects of interest on account of their habits as well as on account of their value in the cabinet. In their season of active life they are found feeding on aquatic plants. Inhabiting localities subject to drying they burrow in the mud as the water diminishes. The collector will for convenience seek them when they are active. Another class, smaller than that just mentioned, but affording a greater number of species and varieties, is more widely distributed, being found not only in the waters of the various States, but also in Canada. They inhabit rivers, lakes, ponds, and canals, and when circumstances favor their habits they will be found most abundantly burrowing just beneath the surface of the soft mud near the shores, where undoubtedly they are attracted by more abundant supplies of food, and perhaps also by a more agreeable temperature. They will often be found in the muddy banks of rivers in great numbers, congregated at the margin of the water. In canals where conditions of food and temperature are very favorable, they attain a more luxuriant development than in neighboring rivers. Some localities are remarkable for affording varieties and monstrosities. Next

to this class in size is one that embraces a large number of species included in several genera and sub-genera. The shells vary in form from a slender turret to a globular form, variously colored, and sometimes curiously ornamented with tubercles, ridges, and carinations. With a very few exceptions these interesting shells are found only in rivers and perennial streams. The different genera of this class seem to be adapted to certain modifications of conditions. Some of these molluscs prefer muddy, sloping river-banks, where they crawl in the comparatively still water on the surface of the mud. Others prefer the rapid current among the rocky portions of streams, where they are found adhering to the surfaces of the rocks. The habits of nearly all molluscs of this class are such as bring them to the shallower portions of the water they inhabit. They can often be reached from the shore with the hand.

By gradual transitions these genera, with their numerous species, are followed by other and smaller genera, some of which are of comparatively limited range; others are widely distributed over the whole country. Nearly all of them have habits in some respects similar to the last preceding class, and will be found on the muddy bottoms of shallow portions of rivers, lakes, &c., or feeding on aquatic plants. The small size of many of these shells renders them somewhat difficult to discover, unless the collector has expedients for securing them with ease and certainty.

Bivalve shells next claim attention, and for convenience they will be considered under two classes, though embracing several distinct genera and species. A class of shells (none of which ever attain dimensions much exceeding half an inch) inhabits nearly every perennial stream having a muddy bottom; found also in stagnant waters, lakes, ponds, canals, and, indeed, in every station fitted for mollusc life. Some species inhabit stations subject to drying during a portion of the year, and careless observers have been deceived on finding them alive in their dried *habitat*, and have inferred they were bivalve land shells! All the shells of this class burrow just beneath the surface of the mud, and are usually found in greatest abundance near the margin of the water, or where there is but little depth. This class embraces some species remarkable for their fragility, others equally remarkable for their minuteness. They are distributed over all the explored portions of the country.

Fresh-water muscles.—This class of shells embraces several genera, which on account of the great number of species contained in them will eventually be more minutely classified in sub-genera. No country in the world produces a greater variety of forms in this class of shells than the United States. In the northeastern portion of the United States the number of species found is comparatively small; but in the south and west the number of species becomes great, and the variety and beauty discoverable in the almost endless species make this class one of great interest to the collector. These molluscs inhabit lakes, rivers, and canals. Stagnant water is unfavorable to them. They afford abundant food for the muskrat and mink, who collect piles of shells on the shore where they bring the molluscs to feed upon them. The shells left by the muskrat sometimes serve as a resort for the collector who is not critical to have the best of specimens, while they should serve to point out to him that there are good specimens, alive, not far distant. Except in shallow portions of rivers it is sometimes difficult, however, to find muscles; but where the water is not so deep but that a person may with security wade in it, it is comparatively easy to discover them. They will usually be found partly buried in the mud or gravel, only enough of the shell projecting to enable the mollusc to extend the syphons of his breathing apparatus into the water above him. A little practice will enable the collector to detect the projecting shell. In lakes and ponds, where the water is not too deep, the collector may readily discover the objects of his search from a boat.

Having thus in general terms given such suggestions as will enable the col-

lector to seek shells understandingly, it will now be proper to speak more particularly of

Collecting.—To obtain land shells the collector needs for the larger species a suitable tin canister, or a number of them, (the cover being perforated to admit air,) to serve as a receptacle for his gatherings. He will soon learn to distinguish immature shells, and unless they are to serve some special purpose it may be well not to secure many such, as, by clearing a station of all that may be found in it, future visits to the same place may not be remunerative. For small shells that will not admit of the same modes of treatment applied for the preservation of large shells, the collector should be provided with a small bottle of alcohol in which to put them. He will find his labor facilitated if he is provided with a pair of light, elastic pliers, the jaws of which are hollowed a little so as to embrace any small object taken between them. With such pliers very small and fragile shells may be picked up and transferred to the bottle with little risk of breaking them, and with much more rapidity than with the fingers alone. The pliers will be found very useful also for handling other small shells.

Such aquatic species as are found where it is most convenient to pick them one by one, may be handled with the pliers; others that are attached to the stems of aquatic plants, especially the class called fresh-water limpets, can best be managed with the blade of a knife, which, being slid under them, serves to convey them to the bottle.

Other aquatic species may be rapidly gathered by means of a perforated tin dipper attached to a wooden handle, which may be jointed like a fishing rod, so as to be available in a variety of stations. The dipper can be used to secure nearly all classes of aquatic shell animals when they happen to be within reach, especially those that burrow in mud, as well as those that crawl on its surface. It may be used among weeds and aquatic plants on which molluscs are feeding.

A bucket partly filled with water is a suitable receptacle for the shells taken with the dipper. In taking the shells that are found in mud, much care is sometimes requisite in sifting out the mud to avoid crushing fragile species. Perhaps a better mode in some instances is to be provided with a large culinary sieve through which to sift the mud, the tin dipper serving simply as a dredge. The sieve, when filled with mud and shells, is to be carefully manipulated in the water until all the mud and sand is washed away. The sifting process may be repeated upon fresh dredgings as often as is necessary, or until the collector has as many shells as he desires. The collector will find more eligible for his purpose a net made of wire gauze, of from twelve to sixteen wires to the inch. A convenient size and form will require an aperture for the mouth of the net about four by eight inches; the depth of the net eight inches. It should be attached to a jointed handle for drawing it along the surface of the mud to be dredged; the margin that enters the mud should have a sharp metallic edge, like a hoe. The net will require a sweep of from one to six feet to fill it with mud; it is then turned over, mouth upwards, and while yet in the water the mud is sifted out. The shells remaining are carefully turned into a bucket of water. With a net of this character the collector may stand in one position and dredge a large area in a very short time, often securing shells in great abundance and with comparatively little effort. The saving in time and labor can only be appreciated by trial.

For collecting fresh-water muscles, when they are found where they can without much inconvenience be picked up by the hand, the collector may dispense with all aids but a basket in which to place his treasures. As he will find species of varying degrees of fragility, all more or less easily broken if carelessly handled, he will observe to place his shells carefully in his basket, and not let them break each other by rude contact. In stations where it may be inconvenient or impossible to wade, a rake, provided with numerous teeth set

close together and having a long handle, has sometimes been used with the most gratifying success. In lakes or ponds of moderate depth, where the bottom is readily seen, the dipper sometimes answers if the bottom is mud. In gravelly bottom a pair of tongs, the blades of which are like huge spoon-bowls, may be used with certainty. The tongs should be made so as to be attached to a sufficiently long rod or jointed pole for a handle, the moveable blade being operated by a string held in one hand, while the other hand guides the instrument to its work.

It is often the habit of the inexperienced collector to content himself with such specimens as from their attractiveness to his eye seem to be all that is worth preserving. Such specimens alone fail to satisfy the wants of the naturalist who extends his interest to every class of natural objects. For this and other equally important reasons the collector is earnestly recommended to secure specimens of every species that comes before him. If he cannot always obtain the best specimens he may serve the interests of science sometimes by preserving specimens that, in the presence of good living specimens, he would cast aside. Dead shells, though not always desirable in a collection of specimens, may serve to point out to the collector where he can find living ones. Dead shells may be preserved if no others can be found.

The collector often passes over species that are abundant at the moment, thinking he can obtain them at any time. This sometimes is a fallacious indulgence, as the habits of many species are affected by inappreciable influences, and often those species which have been abundant cease to be so, much to the disappointment of the collector when, perhaps too late, he has learned they have a value and importance of which he might have availed himself in his correspondence with others.

Preparation of specimens.—The larger land shells, the larger fluviatile gastropods, and the large bivalves may have their soft parts readily removed after having been boiled in water a few minutes. After the soft parts have been removed by means of a small metallic hook, each specimen should be well washed, inside and out, as far as practicable. A small syringe serves readily to rinse the inside of univalve shells. A bit of stick with a tuft of cotton twisted on it is often an indispensable aid in completing the process. A tooth-brush is useful in washing the exterior of shells. Operculated shells should have the opercle replaced within the shell to which it belonged, and if necessary it may be retained in its natural position by means of a little thick mucilage. Large bivalves may be tied with a bit of yarn to hold the valves together; or they may be wrapped in paper to secure the same object after the surface of the shell is dry and the hinge ligament is yet pliable. Care should be taken in the preparation of bivalves not to fracture the thin margins of the shell, nor to tear the epidermal fringe. Indeed, the same care should be taken to preserve *all* shells as perfectly as possible.

Small bivalves that cannot be submitted to the boiling treatment and afterwards closed, as recommended for muscles, and also any very small shells of any class, may be placed in alcohol for twenty-four hours, after which they may be dried in the shade on paper. They may be dried without the use of alcohol, but then the soft parts are longer in drying, and require a longer time to become divested of the unpleasant odor of decomposition. The appearance of the shells is more cleanly after alcoholic treatment, for the reason that the soft parts of the molluscs are contracted into the smallest dimensions thereby.

It sometimes becomes desirable to cleanse the surface of small fluviatile shells, bivalves, and univalves, together. With just enough water to cover them in the bucket in which they were collected add as much clean, sharp sand as will equal the bulk of the shells. Agitate the bucket for a few moments by a rotary and shaking motion. The friction of the shells and the sand on each other soon brightens the surface of the shells. The sand may subsequently be sifted away

in water; the shells may then be rinsed, when they are ready for final treatment, with or without alcohol.

Some shells of considerable size may have the soft parts removed after having been in alcohol a few hours; but having been several days in alcohol (unless it is of low proof) the soft parts do not disengage so readily. Among the shells to which this mode of treatment best applies are land shells with an elevated spire, aquatic species with a short but elevated spire, and fresh-water limpets.

It is not recommended to retain shells in alcohol a great many days, unless it be for the preservation of the soft parts for anatomical investigation. If too long retained in alcohol the shells acquire a dark, smoky look that diminishes their beauty.

INCIDENTAL REMARKS.

With the result of his labor before him the collector desires such information respecting his shells as will enhance the pleasure and other advantages he expects to derive from them. He also desires that they should present, in the most obvious manner, all their intrinsic beauties. Perhaps he forgets that they are most beautiful as nature made them, and seeks to improve them by varnishing. Such shells as the collector designs to preserve in his own cabinet he may varnish if he pleases; but should he desire to acquire other specimens by exchanging his duplicates with a friend, let them be without varnish or any artificial treatment other than judicious cleaning.

In arranging a series of species in his cabinet the collector, if unacquainted with their names, may group his species according to those analogies and obvious resemblances that show their relations to each other. He should attach a label to each species, designating it by a number until he has opportunity to replace the number with the specific name. The label should have upon it the locality where found, and any other facts that might be of remarkable interest to the naturalist. The numbers he attaches to his species may serve as the means of ascertaining names by correspondence. Each species should be marked, so that no confusion may arise by displacement of labels.

Should the collector find it convenient to correspond with some other person similarly engaged, or should he desire to transmit a package of shells to some friend or to some public institution, a few suggestions relative to packing shells for transportation may be of use. Obtain a sufficiently strong box of suitable capacity; on the bottom should be laid a thin bed of soft hay, or some other suitable elastic material. The larger shells (if such are to form a part of the contents of the package) should form the lower tiers in packing. Each shell should be wrapped in paper, and the specimens should be so compactly stowed as not to shake about. The lighter shells should occupy the upper portion of the package, and those of a fragile nature should be protected from the possibility of fracture by being enveloped in cotton and enclosed in suitable small boxes. Small paper bags or cartridges may serve to contain minute species; but a more satisfactory mode is to wrap them in cotton and put them in small paper boxes, such as may be purchased at any drug store. Each species should be appropriately labelled, giving, in legible characters, the generic and specific name of the shell, if known, after which should be written the name of the author by whom the species was published; under this should follow the locality where found. Any vacant space at the top of the package may be filled with any light material that will serve to keep the contents of the package from shaking about after the box is closed. The top of the box should be carefully nailed secure, and plainly marked with the address of the person to whom it is to be forwarded, also designating the mode of conveyance for the guidance of parties to whom it is delivered for shipment.

ON THE COLLECTION OF SPECIMENS OF MYRIAPODS, PHALANGIDÆ, &c.

ACADEMY OF NATURAL SCIENCES,
Philadelphia, February 13, 1866.

DEAR SIR: My excuse for troubling you with the following communication must be my great desire to render more complete the already published monographs of the North American myriapods or centipeds, and also to obtain material for a similar memoir on the phalangidæ or "harvestmen" of the United States. As you are aware, the myriapods are divided into two great sub-orders, the more highly organized of which live on animal food, while others find their sustenance in decaying vegetable substances. These two sub-orders may be distinguished at a single glance by the most inexperienced eye; the first, the true centipeds, by their flat body, each segment of which has but a single pair of legs, and then a head, armed with a formidable pair of jaws; the second, the millepeds by their body being more or less terete or cylindrical, with two pair of legs to each segment, and the jaws of their head not being very apparent. The former may be found under stones, logs, beneath the bark of dead trees, about wood piles and out-houses, in fact, in almost every place which affords them shelter, and is not too wet. The larger species of this group are probably all known, but specimens, with the localities from which they have been obtained, are valuable, as they throw light on the problem of geographical distribution. Among the smaller species, at least the long, narrow-bodied species, (geophilidæ,) there are probably many species still unknown, and of these I would especially solicit collections.

The millepeds are to be looked for in decaying wood, beneath the bark of old logs, &c., as well as in similar situations with the last. The number of facts still unknown respecting these myriapods, and of species new to science, is probably very great, so that collections of them are even more valuable than those of the smaller centipeds. As in most other cases in natural history, the small specimens are the most valuable, affording the largest per cent. of unknown and rare species. When a myriapod is captured it should be thrown into alcohol, the only precaution necessary being to have the alcohol very strong in the case of millepeds, since they are very apt to fall to pieces if the preservative fluid is weak. It is not necessary to separate the species, but the general locality should always be marked both by a label pasted on the bottle, and also by one placed in the inside, the collector's name being distinctly written so as to facilitate acknowledgment.

The phalangidæ, "harvestmen," or "daddy long-legs," of the schoolboys, resemble the true spiders, from which they are distinguished by the great length of their slender legs, by their abdomen being sessile, *i. e.*, attached to the whole breadth of the anterior portion of the body, (the cephalothorax,) and unprovided with a spinning apparatus, as well as by their head, having a single pair of eyes, elevated on a common peduncle or process, and being armed with a pair of two-fingered mandibles. The female deposits her eggs in crevices, in walls and rocks, beneath stones, &c., in the autumn, and then dies. The following spring the eggs are hatched and produce minute individuals, which resemble the mature specimen. These grow through the summer, and reach their full size in the early autumn, when the sexes pair. They are preferably nocturnal in their

habits, generally hiding under stones, on walls, &c., during the day, and during the night hunting their food, which consists of flies, gnats, and other small insects. They do, however, sometimes hunt during even the brightest part of the day. They should be collected during the latter part of the summer and the early autumn, because at that time they are mature. The collector should look for them on the walls, and about the eaves of barns and out-houses, along stone and other fences, beneath stones in dry or even moist gravelly places, under sticks, fence-rails, logs, and the like in dry, grassy groves. In catching them care should be taken not to break their legs, and they should be dropped into a bottle containing very strong whiskey or ordinary alcohol, or spirits of wine. When practicable each species should be preserved separately in homœopathic or other small phials, and an accurate account be kept of the localities in which they may be captured, and any observations on their habits will be especially valuable. After they have been put in spirits, no further care is necessary, except to see that the alcohol does not evaporate and leave them dry.

Hoping that you will be able to obtain collections, I remain yours, respectfully,

H. C. WOOD, JR., M. D.

Professor HENRY.

[The Institution will be pleased to receive from its correspondents the specimens asked for by Dr. Wood, to be placed in his hands for investigation.

J. H.]

A PLAN OF A RESEARCH UPON THE ATMOSPHERE.

BY PROF. C. M. WETHERILL.

WASHINGTON, D. C., *July 24, 1865.*

DEAR SIR: I beg leave to submit to your consideration the accompanying sketch of a plan for securing the advantages of a research upon the atmosphere in our country, which would be not only new, but fruitful of important practical results. The work upon which I was engaged last winter, viz., the ventilation of the Capitol extension, has impressed me with the necessity of this research, and I hope that it will meet your approval.

I am, very respectfully, your obedient servant,

CHARLES M. WETHERILL.

Prof. JOSEPH HENRY, *Secretary Smithsonian Institution.*

The need of a research upon the proportion of carbonic acid (and oxygen) in the atmosphere of the United States.

Plants require carbonic acid, animals oxygen, for their existence; hence an accurate determination of these constituents in the atmosphere is of vast importance, and the knowledge gained from such a research is of great value, both from a scientific and a practical point of view. The question has engaged the attention of scientists (in Europe) from the earliest period of modern chemistry, and its discussion has advanced step by step with the improvement of the methods of analysis. Through the labors of Gay Lussac, Humboldt, De Saussure, Dumas, Boussingault, Lewy, Schlagintweit, and others we are acquainted with

the proportion of oxygen and carbonic acid in the atmosphere, and the influence, upon the quantity of these constituents, of day and night, winter and summer, rain and drought, of storms, and of elevation. These results have been obtained for Europe, with the exception of Lewy's experiments in South America, upon an atmosphere subject to disturbances from the carbonic acid emitted from volcanoes.

The natural tendency of a dense population and a sparse vegetation would be to increase the carbonic acid and to diminish the oxygen of the atmosphere; hence, the United States being in this respect different from Europe, it is of importance to know how our atmosphere differs, as to these gases, from the air of the old country. The research has never been made in America for obvious reasons.

Beside, the increased knowledge in respect to the nature of the atmosphere which such a research would yield, important practical results would flow from it with regard to ventilation, to the hygiene of cities and of military hospitals, to agriculture and the clearing away of forests, &c.

The examination of the ventilation of the Capitol extension, which has occupied my attention during the past six or seven months, has deeply impressed me with the great importance of experiments upon the atmospheric constituents, and practice in the kind of analyses required has led me to propose to co-operate with the Smithsonian Institution in the accomplishment of such a research.

In this co-operation I will undertake the analysis of specimens of air collected by myself where located, and of such as may be procured by the Institution from different points in the United States, the localities to be settled by the meteorological experience of the Smithsonian Institution. I will bear the expense of analysis myself, in respect to the determination of carbonic acid, and to a less extent of the oxygen. If, however, a large number of oxygen determinations are made, I would be glad if the Institution would furnish me with the apparatus of Regnault, or with some other improved one, in order to multiply the observations.

[The investigation proposed by Dr. Wetherill is one of much interest, and as full confidence is placed in his skill as an analytic chemist, and his conscientious accuracy in the statement of the results of his experiments, the assistance required will be furnished by the Institution as soon as the Dr. is prepared to undertake the research. It is probable, however, that he cannot commence the work immediately, since some time will be required to enable him to become familiar with the duties of his new position as professor of chemistry in the Lehigh University.

J. H.]

AN ACCOUNT OF THE CRYOLITE OF GREENLAND.

COMMUNICATED BY MESSRS. LEWIS & SONS.

[Messrs. Lewis & Sons, of Philadelphia, the proprietors of the mine of cryolite described in the following article, have kindly supplied the Institution with a quantity of the mineral for the distribution of specimens to such institutions as may desire to add it to their cabinets. The Institution is also indebted to the same gentlemen for the account here given and a large map which accompanied it.

The mineral cryolite derives its name (from *κρύας*, ice) from its property of melting in the flame of a candle. Its composition is $\text{Na. Fl.}\frac{1}{3} \text{ Al.}^2 \text{ Fl.}^3 = \times$ Aluminum 13.0; sodium 32.8; fluorine 54.2.

It is valuable as an ore of aluminum, for when melted with sodium this metal is liberated from its combination with fluorine, the result being aluminum and fluoride of sodium.

Since the high price of sodium restricts the useful applications of aluminum and its alloys, cryolite has lately become important as a source of soda, considerable quantities of which, with alumina as an incidental product, are manufactured in Pennsylvania from this mineral.]

COPENHAGEN, *November 15, 1864.*

GENTLEMEN: After staying a year at the cryolite mines, the nature of which I have thus had good opportunity of learning, I can give you the following information about them, as they were at the time of my departure in the autumn of 1864.

The cryolite mines are situated at Trigtut, (or Triktout,) on the south side of Arsut Fjord, in South Greenland, $61^{\circ} 13'$ north latitude and $48^{\circ} 9'$ west longitude. The surface of the vein of cryolite was originally covered with a layer of clay, gravel and earth, which loose material is now chiefly removed, there remaining only in the most southern part of the area of cryolite, a part not yet perfectly uncovered. The boundaries of the vein toward the surrounding mountain is everywhere very conspicuous, with the exception of a part of its northwest side.

The vein, the greatest length of which is about 600 feet, breadth about 150 feet, and extent of which can be reckoned at about 53,000 cubic feet, is of two parts, one close to the Fjord, the other to the east, and separated by a rock from 5 to 15 feet high and about 100 feet broad. The western part is washed by a little bay going in from the Fjord along its whole extent; this is now partly filled up, and will in time be perfectly separated from the sea, when the stone breakwater, now under construction, running in west-southwest and east-northeast direction, straight across the mouth of the bay, at a distance of about 250 feet from the cryolite mine, is finished, and when the whole of the bay inside the breakwater is filled up, which two works will in all probability be finished before the close of 1865. The rock bounding the vein is everywhere on the boundary line itself 10 to 15 feet high from west, and the south boundary rises tolerably quickly in towards land. The surrounding elevation is chiefly of granite, crossed in several parts by veins or layers running from northwest to south.

The principal mineral of the vein is, of course, the cryolite, but as constant

accompaniments we find quartz, iron-stone, lead ore, copperas, sulphur, arsenic, tin-stone, (the last two very seldom.) These substances are not evenly distributed through the whole mass, but the cryolite is partly found quite clean and unmixed; while larger and smaller quantities are found containing more or less of the above-mentioned minerals.

A strip of the vein only a few feet broad along the south and southwest boundary of the same is conspicuous for its richness in iron-stone and quartz, but especially for lead ore and copperas. The surrounding mountain is also, in certain places, viz., along the southwest boundary strongly impregnated with lead ore, copperas, and varieties of arsenic, tantalite, molybden ore and tin-stone. In the cryolite are found pieces of the surrounding mountain, both of granite and of trap; it is therefore quite certain that the cryolite has come from the interior of the earth by volcanic agency, and that it is newer than the granite and the trap. The melted mass of cryolite has, during its progress through the granite, torn off parts of the latter and enclosed them in itself. The cryolite vein is what is called a block with face towards south and southwest; in the south and southwest boundary of the vein the cryolite can plainly be seen going under the granite, in a very rapid dip, as much as 25° ; at one place, however, where the cryolite forms a kind of peninsula running west, the dip seems to be about $0^{\circ} 12'$; the cryolite appearing to continue under the mountain in a horizontal direction. As far as the quality of the produce is concerned, the cryolite vein consists of two different unequal parts, divided by a breakwater 60 feet high and 110 feet long, running northwest and southeast.

I. The part east of the breakwater, whose greatest length and breadth are about 235 and 100 feet, and whose total extent can be reckoned at about 16,000 cubic feet, consists of two parts—a northerly, 7,000 cubic feet in extent, which is totally of perfectly clean white cryolite, without any mixture whatsoever of unclean minerals, with exception of the mass or part on the surface of the angles or separation, which is colored red or yellow by a very thin layer of ochre or clayey iron; this part runs north and east right up to the granite. In the south and west it is surrounded by the second or southerly part, whose extent amounts to about 9,000 cubic feet, containing only impure cryolite, much mixed with quartz.

The north part is almost all mined to a depth of fourteen feet below high-water mark; the eastern part of the same only to a depth of 11 to 12 feet, and on the western corner a pump-shaft descends to a depth of little more than twenty-two feet below high-water mark. The southern part, on the boundary towards north, is worked to a depth of four feet below high-water mark, but it rises gradually towards the south until it is somewhat over high-water mark.

To keep the east mine free from water an engine is used which works four pumps, and has been more than sufficient to keep the working places free from water. The engine is calculated to raise the water from a depth of forty feet below high-water mark; until the whole mine exceeds this depth no greater power will therefore be required. The mine during the winter is of course, filled with snow and ice, and all blasting must, therefore, cease from the months of November to April. In the months from May to October the mine can be worked, except under unusually severe climatic conditions, and I think in this time, with a gang of fifty men, about 5,000 tons of cryolite can be had.

To convey the pieces broken out to the place where they are piled up, the two following means are used:

1. Toward the north on the granite rock before mentioned, which separates the eastern mine from the Fjord, is a horizontal road, running in a north and south direction on a level of one foot above the highest high-water mark, and on this road is laid a tramway running to a spot which has been filled up in the Fjord, in the middle of which is a turn-table and siding. The cryolite can be shipped from here with great ease, generally without the use of barges. At the southern

end of the road called the heading is a crane for hoisting the cryolite from the bottom of the mine to the tramway.

2. In the south side of the eastern mine is built an inclined iron road, leading from the southwest corner of the mine in a west-northwest direction up on to the breakwater, which forms the west boundary of the mine. Here the iron road is continued horizontally in the same direction, west-northwest, for about 100 feet, where, by means of a turn-table, it is connected with a cross line leading north, and with a stone basin built in the Fjord, where at low-water it has to be shipped in barges. At high-water it can be put at once on board the ships. Under the supposition that the dimensions of the mines remain unchanged in depth, the northern part will yield 630 tons of pure cryolite, and the southern part 610 tons of impure cryolite; estimating the weight of one cubic foot cryolite at 180 pounds, and a ton at 2,000 pounds.

II. The western part of the cryolite vein adjoins the breakwater towards the east which has been mentioned several times before; towards the west and south it extends up to the granite; towards the west the boundary is uncertain. The greatest length and breadth of this part, which on the drawing is marked "C," are respectively 200 and 120 feet; its whole extent can be reckoned at about 20,000 cubic feet, consisting of medium clean cryolite. About a third of this is blasted to a depth of four to five feet under high-water mark; the rest lies level with highest-water mark, with the exception of a small part extending from the south-most corner along the southeast boundary, where the cryolite rises to a height of five and a half to eight feet over high-water mark. In the front towards the west the cryolite is nine to ten feet over highest-water mark. In the extreme southeast corner of the west part a vertical shaft (with a profile twelve feet long and twelve feet wide) is blasted to a depth of about twenty-four feet under high-water mark; at this place the cryolite became better as we went deeper; it was whiter and less mixed with iron ore, sulphurous particles, and lead ore. By driving a network of horizontal galleries, crossing one another in the western part, from the shaft at the commencement, and supporting the passages with pillars, it will probably not be very difficult to procure, with a gang of about fifty men, 2,500 or 3,500 tons in the course of those months in which the open mine cannot be worked.

To keep these mines free from water, an engine with the necessary pumps is used, which, if the water streaming in does not in future increase in the twenty-four feet deep shaft, will be able to keep the mines clear of water to a depth of about forty feet under high-water mark.

Supposing that the length and breadth of this western part will remain unchanged in descending, each foot in depth will yield 2,700 tons of medium cryolite. The following remark should be made: towards the west the vein of cryolite forms a characteristic point or peninsula, (springing into the side stones,) which has been before mentioned. The space between this point and the stream, about 120 feet west, is occupied by a cupola-shaped hill, whose highest point is thirty-seven and a half feet above high-water. In the northeast part of this, several hollows are found, which have hitherto not been carefully examined, but in which traces of cryolite have been found. These holes have probably formerly been filled with cryolite, which has afterwards been removed or conveyed by running water or other means. From this and the nature of the cryolite in the projecting point, where the vein seems to go horizontally in, we have reason to suppose that cryolite can be obtained under the granite in the whole extent of "D." As it probably continues under the mountain with the same, or with slight variations, from the height with which it enters at the point, (or peninsula,) it will be easily worked by going in under the rocks with horizontal passages, in a level not under high-water (by which annoyance from water will be avoided) either from the sea-side or from the north or from the east.

Under the supposition of the doubtless volcanic origin of the cryolite, and, therefore, of the almost certain boundless depth of the vein, there can never be any fear of a lack of the mineral. The difficulties, chiefly with water, snow, and ice, will doubtlessly increase as the mines deepen, but with proper steam power and good engineering direction, these difficulties may be overcome. Supposing that the length and breadth of these different parts remain unchanged in descent, working the whole to a depth of forty feet under high-water mark, will give the following result:

A, whose medium level can be fixed at fourteen feet under high-water mark, will give 16,380 tons clean cryolite. B, whose medium level is about two feet under high-water mark, will give 30,760 tons of dirty cryolite. C, whose medium level is about two feet over high-water mark, will give 113,400 tons medium cryolite. Working the whole to a depth of forty feet under high-water mark will, therefore, give about 160,000 tons cryolite of different qualities.

In regard to the relations and matters concerning the cryolite mines which are not mentioned here, I beg to refer to what I have formerly written from Trigtout.

Respectfully,

PAUL QUALE.

EXTRACTS

FROM

THE METEOROLOGICAL CORRESPONDENCE OF THE INSTITUTION, WITH REMARKS BY THE SECRETARY, PROF. JOSEPH HENRY.

The object of the publication of the following correspondence and remarks, is to record isolated facts of interest, and to answer inquiries which are frequently made by meteorological observers.

From W. C. Dennis, Key West, Florida.

NOVEMBER 10, 1856.

I have been mindful of your remarks as to my opportunity to gather facts relative to surface evaporation. I have given a great deal of attention to the subject, but my principal object has been to learn the conditions which attend an increase of evaporation, for the purpose of applying them to practical utility in the manufacture of salt. There is a difficulty in the way of getting the yearly amount of evaporation from an ordinary surface, as I am convinced that evaporation goes on much slower from sea water as it approaches the state of saturation; consequently in order to get useful data to determine the yearly surface evaporation, the water employed should either be fresh, or kept at about the strength of sea water. So much difference is there in amount of evaporation from ordinary sea water and brine, nearly at saturation, that while the former evaporates at say 0.05 inches per day, the latter remains nearly stationary.

This fact I noticed frequently last summer, when the air was damp and heavy with dew at night. In the morning after a heavy dew, I often found brine that was very strong, weaker than it was the night before. This I suppose may be accounted for by the strong affinity water has for salt.

The hygrometrical condition of the air makes a great difference in the amount of surface evaporation. The past year has been very damp, but the rains have not been remarkably heavy, yet everything goes to show that there has not been much over half the evaporation that there was in 1851 and 1854, years in which there were heavy rains. Through this summer I did not observe the evaporation of quite 0.10 inch in any twenty-four hours. In 1854, in the month of May, I noted the evaporation in one day (twenty-four hours) of full 0.30 of an inch. From this it can be seen that in order to ascertain the average yearly evaporation from a given surface of the ocean, it will be necessary to make accurate *daily* observations for a number of years, with ordinary sea water kept at the same degree of density.

I have found that evaporation goes on faster, when the weather is clear and *calm*, from the surface of very shallow water than from deeper water; but when the wind blows sufficiently strong to form a ripple or wave, evaporation goes on faster from water that is six inches deep than from that which is not more than one or two inches. Some other of my observations lead me to think that very little heat is absorbed by perfectly *clear* water in the passage through it of the direct rays of the sun, and that the maximum heat to which it is possible for the sun's rays to bring water depends on the color of the bottom that reflects back those rays, as well as on the shallowness of the water.

REMARKS.—The difference between the evaporation from salt and fresh water is readily shown by covering the bulbs of two thermometers with linen cloth, and wetting one with salt and the other with fresh water. The reduction of temperature will be greater with the latter than with the former, provided the wetting be renewed from time to time; but if the two linen envelopes be suffered to dry, the one to which the salt water is applied will continue wet the longer, and thus indicate towards the end of the experiment a lower temperature.

Although the difference of evaporation of salt and fresh water is apparently very obvious, yet it has been asserted by a distinguished meteorologist that the covered bulb of a thermometer sinks to the same degree whether wet with salt or fresh water, and the evaporation from the sea is the same as from fresh water lakes; but this, as we have seen, is not correct.

From the same.

JANUARY 8, 1857.

A most strange phenomenon occurred on the last days of last month. Large streaks and fields of fresh water were discovered in the bay to the north and northwest of this island. The water was of dark color, but otherwise clear, and so fresh that many drank of it. At the same time toadfish, eels, snakes, &c., which always inhabit salt water alone, came on shore in great numbers, dead and dying. For a time the existence of fresh water was not believed, the death of the fish being ascribed to the norther of the 22d and 23d of December; but four days ago fresh water was reported in the harbor of Key West. I examined, and found, at the last of the ebb-tide, water at $2\frac{1}{2}^{\circ}$ Beaumé all along the wharves. At one place it was 3° , and when I got home I tried the water at my salt house, two miles distant, and found it 5° . The day before at salt house it was 4° . Evidently the water was fresher in the harbor the day before I tried it. I am continuing the examination, and will write you again. What is the cause of this? Westerly winds could not have deflected the waters of the Mississippi, Alabama, &c., here. Have not the waters of the Everglades, which have been very high for a year past, found cavernous outlets through the soft lime rock into the bay? This rock underlies the entire bottom of the Everglades.

From Rev. C. Dewey, Rochester, N. Y

MAY, 1857.

I think more attention ought to be paid to observations on the winds. It only needs a thought to convince us that the clouds alone can show the general current of the wind, and that the vane shows merely the under and local currents. The charts of some storms show a wonderfully strange direction of the wind in some parts of our State; the reason is that the surface winds are those which are exhibited.

The attention is directed more at this time to the upper winds, I know, and have no doubt that the direction of the wind in this State, and even New England, in Professor Coffin's admirable expositions of the winds in the Smithsonian Contributions, will be found not to correspond with the results obtained from observations for the next twenty years. There is too much reliance by observers now, I fear, on surface winds. I should rather give up the wind vane and direct their eyes above and below; the difference may not be great, but too much for the designed accuracy of results now and in the future.

REMARKS.—We fully agree with our much esteemed correspondent, whose remarks on any branch of meteorology are entitled to special attention, as to the importance of observations on the motion of the clouds, upper and lower, in de-

termining the great currents of the atmosphere. The resultant winds of the valley of the Hudson, as determined by the surface wind, are north and south, while the resultant wind of the whole State has a westerly direction. Still we would not dispense with the use of the wind vane. There are many places where its indications are strictly correct, when it is placed at a proper elevation; and at almost any place of which the topography is well known an approximation to the true direction may be deduced from the directions indicated by the vane. Moreover, the vane serves to give the direction of the *changes* of the wind, an important element in the theory of the phenomena of storms; and even the indication which it affords of the lower surface winds is of value in perfecting our knowledge of the influence of moderate inequalities of the surface on the direction of currents of air and the distribution of temperature.

In the records of the motion of the clouds care must be taken to state whether they are the upper or lower.

From J. Baltzell, Tallahassee, Florida.

SEPTEMBER 16, 1857.

The regular wind on the Atlantic coast of Florida, from which is derived the health and comfort of the inhabitants in the summer, is a southeasterly one from the sea, filled with moisture, evidently having saline particles, and stimulating in its effects. The wind at this place, which produces a like effect in the summer, giving us life, health, animation, and comfort, is the southwest, which comes from the gulf of Mexico, about twenty miles distant; I think it is not as stimulating, or as highly charged with saline particles, as that on the Atlantic coast. With us the east wind is dry, parching, and uncomfortable, prevailing not longer than a week at a time, and, if for a month or more, sickness is sure to follow, with extreme lassitude, depression, and nervous uneasiness. On the Atlantic coast, as I was informed in a recent visit, the northeasterly winds produce these results.

I think it will be found that the injurious effects of our east wind are not dependent upon the flat lands between this and Georgia. In general, the pine woods of this region are dry, with no water upon them, and they are generally regarded as very healthful; occasionally there are wet seasons, in which the low lands are for a short time covered with water.

I cannot give you information as to the prevailing direction of thunder storms, but will bear it in mind, and if I can obtain anything of value, will communicate it to you.

REMARKS.—The east wind, which reaches Tallahassee from the Atlantic, passes over the whole of that portion of Florida lying between the city and the ocean; a distance ten times greater than that traversed by the current from the gulf. This is sufficient to explain the greater heat and dryness of the air. The same amount of radiation from the sun raises the temperature of the land much more than it does that of the water; the specific heat of the latter being about six times greater than that of the former.

From L. F. Ward, Medina, Ohio.

OCTOBER 5, 1857.

I broke the tube of a standard barometer, and in trying to replace it, and preparing to do so, I wiped out the tube carefully with a wooden rod and cotton wool, and laid it by until I could prepare the mercury. Soon after laying it down it began to break up into sections, and some of those sections to split

longitudinally. In two days it was broken into more than thirty pieces. The tube was $\frac{3}{4}$ -inch diameter and $\frac{3}{8}$ -inch bore. Now, I am unable to give any reason for the breaking of this tube. Are you aware of its cause?

REMARKS.—This is so far from being an unusual phenomenon, that it has been observed by almost every one who has attempted to clean a barometer tube. It results from imperfect annealing, or, in other words, a too rapid cooling, which has left in a condition of opposing tension the outer and inner surface of the glass. The explanation usually given is as follows: When a tube of glass is heated to redness, and then exposed to air of a low temperature, the outer stratum is suddenly cooled, and its particles brought into a state of equilibrium, while the inner strata are still in an expanded condition; afterwards, when the latter shrink by gradually cooling, they tend to separate from the former, and thus produce a condition of unstable equilibrium. Hence the slightest scratch in the interior, of which the particles tend to separate, is sufficient to rupture the continuity, and cause the fracture of the glass.

That such a state of unequal density of the outer and inner strata does actually exist, is shown by the effect produced on a beam of polarized light transmitted through the tube at right angles to its axis; and this affords a ready means of detecting the existence in a piece of glass of defective annealing.

From Seth L. Andrews, Romeo, Michigan.

JANUARY 8, 1858.

The annual occurrence of shooting stars recalled to my mind a similar phenomenon witnessed many years ago, which, if it should not be already recorded, may be of some interest. Upon referring to my journal I found the following entry:

“DARTMOUTH COLLEGE, HANOVER, N. H., *August* 10, 1830.—Fair. The aurora borealis is very bright this evening; an arch is extended across the heavens about 5° above the horizon, with a dark cloud in the space below.

“Meteors (shooting stars) are darting across the heavens almost every minute; their apparent size varies from that of a spark to that of the planet Venus.”

My recollection of the phenomenon is that they were more frequent than I have ever seen since. I have in mind the same phenomenon witnessed on the 9th and 10th of August, 1838; I was then at the Sandwich Islands. I am not able to find that I recorded it, and it is barely probable that it may have occurred a year or two later. On the first evening the meteors were most numerous and brilliant, some of them equalling Venus in the intensity of light.

REMARKS.—The dark segment under the arch is a general, though not an invariable accompaniment of the aurora. It may in part be due, as has been suggested, to contrast with the light of the aurora; but it cannot be entirely referred to this cause since there frequently remains after the light has ceased to appear, a dark cloud in the place previously occupied by the segment. The phenomenon is evidently connected with the precipitation of the vapor of the atmosphere at the time of the passage through it of the auroral beams. I have in some cases seen a perfectly clear sky almost instantly covered with a mistiness during a vivid display of the aurora. The same also sometimes occurs when no aurora is visible.

From James Balfour, Newport, Illinois.

SEPTEMBER, 1858.

The remarkably mild winter in the months of January and December has been sufficiently commented upon by the newspapers, but we cannot look to them for the cause. The west and southwest winds prevailed nearly all the time, especially in the upper atmosphere, very seldom changing to south or northwest. It is well known that changes in the weather are produced by the difference of temperature of the equatorial and polar currents. When two currents in different directions meet, clouds are invariably formed. When two currents unite in the same direction the sky becomes clear. On the 1st of February I had an opportunity of noticing three different currents in the air at the same time. In the lower atmosphere the wind came from the north; an east wind drove light cirri from Lake Michigan, and above them were transparent cirri coming from the southwest. Towards noon the two lower currents combined in one, having a northeast direction, which, gradually veering to northwest, ended in a snow-storm towards night, lasting till noon of next day.

On the 3d a west wind made a clear sky, with the thermometer at 10° Fahrenheit.

On the 10th of February we had a temperature of 12° Fahrenheit; on the 11th, 18° Fahrenheit, with a sharp west wind, whereby Lake Michigan showed the phenomena of rapid evaporation, the whole expanse of water appearing like a boiling caldron, light cirri over the lake indicating the transformation of vapors into clouds.

REMARKS.—It cannot be doubted that on the meeting of the contiguous surfaces of two streams of air moving in opposite directions, and having different temperatures, clouds must be formed, though I think it more probable that, in accordance with the theory of the late Mr. Espy, rains and violent winds are generally produced by an upward motion of the air, and the inblowing from opposite directions of currents of air to supply the ascending mass.

The phenomenon mentioned by our observer, of the fog on the lakes, is an interesting illustration of one of the ways in which fog is produced. While the atmosphere was at a temperature of 18°, very nearly, if not entirely, all of the vapor which it had contained was condensed, and it might be considered at that temperature as incapable of holding any moisture. At the same time, since the lake was not frozen, it had probably a temperature of about 40°, and would at this temperature give off a considerable quantity of vapor, when not resisted by the vapor already in the atmosphere. But as soon as this vapor was projected into the exceedingly cold stratum of air above the surface of the lake it was condensed into minute globules of water, constituting the elements of the cloud. Paradoxical as it may appear, it is probable that more water was evaporated from the surface of the lake during this extremely cold weather than was given off on warmer days, when the air was more nearly saturated with vapor. In the case under consideration had the air been of the same temperature as that of the water, or even greater, and fully saturated with moisture, no evaporation would have taken place; the vapor already in the atmosphere would by its reaction prevented any more from being formed.

From Geo. C. Huntington, Kelley's island, Lake Erie, Ohio.

MAY, 1859.

There is one feature in our climate which is peculiar. Dew during the heat of summer is the exception, not the rule. This I know from observation continued through twenty years' residence here.

Another peculiarity is an exemption from frosts in autumn. We almost invariably see notices of frosts in the southern States before we experience anything of the kind here.

REMARKS.—The want of dew on Kelley's island, in lake Erie, may perhaps be accounted for by the great amount of vapor which must exist in the atmosphere over the great lakes, and which after the sun begins to decline is slightly condensed into a thin haziness, which prevents the radiation from the earth. The exemption from early frost is perhaps partly due to the same cause and partly to the equalizing effect of the large body of water on the temperature of the air which is contiguous to it.

From Conrad Mallinikroot, Augusta, Missouri.

JUNE, 1859.

My twenty years' observations at this place seem to prove that the changes of the wind follow the motion of the sun, viz: from east to south; from south to west; from west to north; from north to east, and so on.

If it once springs back in the other direction it is of short duration, and soon the main succession is restored.

REMARKS.—This has been shown by Dové to be the normal motion of the points of the weathercock in the northern latitude, and has been called the normal rotation of the wind. In places south of the equator the rotation takes place in an opposite direction.

The explanation of the phenomenon is not difficult when considered in relation to the different easterly velocity of different parts of the earth's surface as it revolves on its axis. A cannon ball projected directly toward the north describes on the surface of the earth a line curving towards the east, on account of the eastward motion which it received from the earth at the point of starting being greater than that possessed by the several points of the earth's surface which is passed over in the flight of the ball to northward. The longer the motion of the ball continues the greater will be the curvature. For a similar reason a ball shot directly south will describe a line curving to the west. Now, suppose a wind produced by rarefaction of the air, or by any other cause, to commence near an observer, and to blow directly from the south in a broad stream. If it continues to blow, say for several hours, the particles of air which compose the stream must start from points more and more remote, as would be the case with the particles of water in a long trough of which the north end is suddenly removed. Each particle of air in the stream must curve to the east, and the greater the distance it has travelled the greater must be its easterly motion. The particles of air which first strike the weathercock must turn the point of the arrow very nearly south, while those which impinge against it after the wind has blown for some time, having a greater easterly motion, must direct the arrow to the west of south, the westerly direction increasing as long as the wind continues to blow from more southern parallels of latitude. For a similar reason a wind commencing to blow from the north must turn the point of the arrow more and more to the east the longer it continues to flow southward. A similar result, but differing in degree, must be produced from whatever intermediate point the wind commences to blow, providing the current continues to flow in a broad stream for a few hours.

Hence, as a consequence of the rotation of the earth on its axis, the wind, at a given place in its normal flow, must cause the point of the arrow to move in the direction of the apparent motion of the sun.

When the arrow is observed to turn in an opposite direction we may be sure

that this result is produced by a storm or an abnormal disturbance of the air travelling in this latitude eastward, and drawing, as it were, the air towards it, and thus changing the direction of the arrow.

From Francis L. Capen, Chicago, Illinois.

AUGUST, 1859.

I have stumbled upon the discovery of the meteorological system of the globe, and will furnish a programme of the weather in advance for Washington.

REMARKS.—The discovery of a single scientific fact may be the result of a happy accident, but a scientific principle can never be stumbled upon. It must be the result of reflection and investigation, and is generally arrived at by the successive efforts of a number of minds, each making a step in advance, while in general the popular credit is given to the one who finally presents it to the world in its simplest form. Even important scientific facts are at the present day rarely discovered by accident, and only, when the accident happens, to one intimately acquainted with the latest developments of science, and who is well qualified to recognize the value of the facts thus presented. We are, therefore, not disposed to place much reliance on the meteorological system which has been stumbled on by our correspondent.

From A. Fendler, St. Louis, Missouri.

OCTOBER 2, 1860.

I have reduced my half-hourly barometrical observations made at Colonia Tovar, in 1857, to the freezing point, in order to find out whether the mean maximum and minimum of the whole differs much in point of time from the maximum and minimum of the *not* reduced observations. The result shows that there is a slight difference. The time of maximum as well as that of minimum in the reduced observations is found to be somewhat earlier, having the maximum at 10 a. m., instead of 10.30 a. m., and the minimum between 4 and 4½ p. m., instead of 4½. These reduced observations I have also sent along with the register for September.

From Spencer L. Hillier.

SEPTEMBER 5, 1861.

I am reminded of an incident that occurred in Red Wing, Minnesota, when I resided in that State, which may be of interest to you. A man was lathing in the second story of a new brick house, when a discharge of electricity took place, which, passing through the first and second floors, taking his body in its course, killed him instantly; and, strange as it may seem, it carried his cap up to the ceiling, there wedging it fast among the laths, where it remained till taken down the next day.

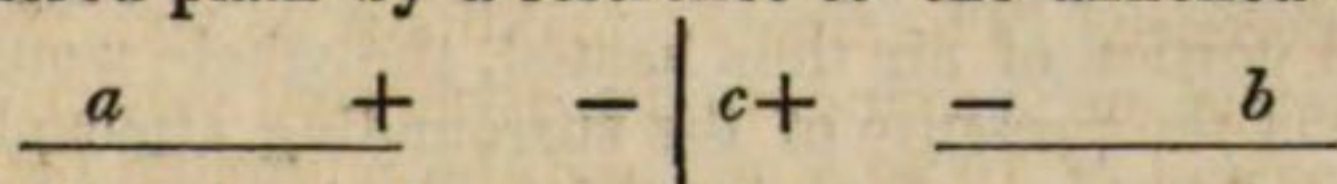
REMARKS.—This is by no means a very uncommon incident, since there are many cases on record of similar occurrences.

The late Dr. Carnahan, president of the college of New Jersey, a man of remarkable precision of observation and truthfulness of description, informed me of an accident by lightning which fell under his notice near Princeton. In this

case, a negro man standing under a tree during a thunder-storm was struck with lightning and instantly killed; but the surprising part of the occurrence was the fact that his woolly hair was afterwards found adhering to the branches of the tree, several yards above his head.

There are also apparently well-authenticated cases in which an image of a body standing before a plastered wall has been transferred to the latter by a discharge of lightning passing from the one to the other.

These phenomena, though very surprising, are not inconsistent with well-established principles of electrical action. It has been fully shown by logical deduction from theoretical principles, and also abundantly proved by experiment, that the atoms of matter which exist along the path of an electrical discharge violently repel each other at the moment of the transit, the greatest intensity of the force being in the direction of the axis of the discharge. The effect may be illustrated by sending a discharge from an electrical battery through a narrow slip of tinfoil cut into parts, by passing the blade of a knife across it at intervals. The ends of each will be turned back on themselves, indicating that they have been subjected to a violent repulsive energy. It would appear that at the moment of an electrical discharge through a conductor, each atom becomes for an instant highly charged, and thus exhibits a repulsive force sufficient in some cases to separate the matter into its component parts. If a powerful charge be sent through a brass wire, the compound metal will be dissipated into powder of zinc and copper. But the transfer of matter in the line of the axis of the discharge is best shown by placing perpendicularly a plate of polished copper midway between two conductors, at about an inch and a half apart, the ends of the two which are turned towards the plate being covered, one with gold and the other with silver foil; after a powerful discharge from an electrical battery has been sent through the two conductors and the intervening plate, the gold foil on the one side will be found deposited on the plate, and the silver on the other. In this experiment the two metals at the same moment are carried in opposite directions, and, what is still more remarkable, upon minute inspection it will be found that particles of the copper plate have also been sent in opposite directions, and deposited on the opposite end of each conductor. The explanation may be rendered plain by a reference to the annexed diagram, in which



a and b represent the two conductors, and c the intervening copper plate, while the electrical condition of the several points of the system, at the instant the discharge is about to take place, is indicated by the signs $+$ and $-$. From this diagram it will be evident that if the gold leaf be placed on the end of the conductor a , it will be repelled by this conductor, because both are $+$ electrified, and will be attracted to the near side of the plate, this being $-$ electrified, while a similar effect will be produced on the opposite side of the plate.

Although the repulsive and attractive action is the most intense in the line of the direction of the axis of the discharge, it takes place also in every direction. This is especially the case when a discharge is passed through air, and to this must be referred the surprising mechanical effects exhibited when a powerful discharge of lightning traverses a confined portion of air. In one instance, which came under my own observation, a stroke of lightning fell upon the chimney on the west end of a house; broke through the flue into the cock-loft or space immediately under the roof, and, passing through this a distance of about twenty feet, entered the flue of another chimney on the east end, in which was a stove-pipe, and descended to the earth. In its passage through the cock-loft, the particles of air near or in its path were rendered in an instant so mutually repulsive that they separated with such explosive energy as to lift up bodily the whole roof.

From Henry M. Bannister.

SMITHSONIAN INSTITUTION,

January, 1867.

In returning to New York from San Francisco in the present month, I observed a curious phenomenon in the formation of clouds over the Gulf Stream. We found ourselves in the stream on the morning of the 19th, the temperature of the water being 70° Fahrenheit, that of the air at or below freezing point. The whole surface of the sea was covered with vapor, which was most dense at the level of the water, but did not much interrupt the view at the elevation of the vessel's deck. The vapor ascended in forms exactly like that of a water-spout, for which we at first mistook them. The long rosy column, swaying to and fro, was very distinct in many instances, several being seen at one time. When this was not developed we could still see a point stretching downward from the cloud above, and ragged masses of mist rising to it from below. We passed several of these vapor-spouts quite near enough to make sure of their real nature. They did not appear to be of any density, nor were there any signs of disturbance in the water or atmosphere about them. They were seen on all sides, several at a time. When we had crossed the Gulf Stream, and got into water of at most not more than 40° , we left the fog and had a clear sky over head, and on looking back the boundary of the stream was distinctly marked by the line of clouds hanging over it.

REMARKS.—The phenomenon of a cloud suspended over the Gulf Stream, marking its boundary, must have been frequently observed during winter, when there exists a great difference between the temperature of the water and that of the air, as in the case described by Mr. Bannister, while the interesting appearance of ascending columns, such as he has mentioned, must be of less frequent occurrence. It can probably happen only when the excess of the temperature of the water above that of the air is near a maximum, and this again can only occur after the air above the stream has been cooled by a northwesterly wind followed by, at least, a partial calm. In this condition the stratum of air immediately above the water would be heated, its specific gravity diminished, and the superincumbent mass brought into a state of unstable or tottering equilibrium. In the case of a small portion of air thus heated, the whole would rise in a single column on account of the pressure of the surrounding atmosphere; but in that of a large extent of heated surface, in which the temperature of the air above shades off gradually at the borders, the equilibrium will be restored by small ascending columns.

A similar phenomenon is sometimes observed on extended sandy plains in the form of ascending dust columns. They are interesting as serving to throw light upon the causes of the water-spout and the land tornado, which have generally been referred to electrical action, but which can be fully explained without the introduction of this principle other than as an effect and a modifying agent. In the case of the water-spout and the tornado, the unstable equilibrium may be produced by the gradual heating of the lower stratum, next to the water or ground, when saturated with vapor, by the rays of the sun, or perhaps in some cases by the passage of a heavier stratum over a lighter one next the earth. The intensity of the upward motion will generally be in proportion to the greater thickness of the heated stratum and the comparative density of the upper. In my meteorological essays published in the Patent Office Reports, I have endeavored to show that a thunder-storm, in accordance with the theory of Mr. Espy of the upward motion of the air in case of storms, is an upward moving column, in which the ascent is produced by the causes we have explained, and that the electrical effects exhibited are due to the disturbance of the equilibrium of the natural electricity of the ascending column of conducting vapor by the negative induction of the earth below and the positive influence of space above,

or, in other words, that lightning is the result of conditions almost precisely analagous to those under which sparks are drawn from the lower end of a kite string under a clear sky.

From the same.

JANUARY, 1867.

During my residence at St. Michael's, Russian America, between Alaska and Behring's straits, while in the service of the Western Union Telegraph Company, I kept a meteorological register according to the instructions received from you. This is now in the possession of the company, but I understand that a copy is to be sent to the Smithsonian Institution.

The register extends over a period of eleven months, between October 1, 1865, and September 1, 1866. The barometer, thermometer, direction and force of the wind, and face of the sky, were noted three times a day, and the first two, on every seventh day during the winter months, hourly, between 7 a. m. and 9 p. m. I also noted casual phenomena, auroras, haloes, &c., and the times of the beginning and ending of storms of rain and snow. The amount of precipitation was not recorded.

The general movement of the air during the year appeared to be from a little east of north, though in midsummer the southerly winds were the most numerous and violent. In every instance, save one, during the winter, a high wind, no matter from what quarter, was followed by a rise in the thermometer. The one exception was a southerly wind from the direction of open water.

The maximum of the thermometer was $69\frac{1}{2}^{\circ}$ Fahrenheit, in July, the minimum — 36° Fahrenheit in January. It probably descended still lower, but not at the hours of observation. The mean temperature for the three spring months was $28\frac{3}{4}^{\circ}$ Fahrenheit; for the summer, $52\frac{3}{8}^{\circ}$ Fahrenheit. That of the year was probably near 26° Fahrenheit—possibly a little lower.

We had one sharp thunder shower in July, the first that had occurred at St. Michael's for thirteen years, according to the statement of the residents, though thunder is not rare in the mountains of the interior.

The aurora was often observed, and was sometimes very brilliant, though not quite as frequent as I had expected. Ten was the greatest number observed in one month. One or two instances, I think, are worth mentioning here.

On the evening of August 23, after the corona had formed, streamers descended to all parts of the horizon; a cloud filled the whole southeastern portion of the heavens, but the streamers appeared even brighter against its dark surface than in other parts of the sky. It is my belief that they were between us and the cloud, which was quite dense. I observed a similar appearance in October, 1865, but I have not the record of it with me. Later in the evening the ordinary arch from northeast to northwest appeared.

An aurora, observed by Messrs. Pease and Ketchum, at Aloukuk, a place about forty miles inland from the head of Norton Sound, in November, 1865, was described as appearing against the side of a mountain a few miles distant, so that the top of the hill was seen above the display, and it was also accompanied with a hissing noise. The air was quite still, its temperature near — 30° Fahrenheit. While the display lasted it was light enough to read the finest print.

I have never myself heard these sounds with the aurora, though once, in the month of January, they were reported to me at St. Michael's by Russian residents, at a time when, on account of indisposition, I was unable to verify the statement by personal observation. I have no doubt, however, of their occasional occurrence.

In all cases the points of the compass are given according to the magnetic and not the true north. The variation in the vicinity of St. Michael's, according to Russian admiralty charts, is $30^{\circ} 30'$ east.

REMARKS.—Thunder storms are most frequent and violent in tropical regions; they seldom occur in high latitudes, particularly on the ocean. This is probably due to the coldness of the surface and the consequent small amount of vapor in the atmosphere, a thunder storm, being as we have said in the foregoing remarks on the Gulf Stream, a large ascending column of air rendered of less density than the stratum immediately above, by an excess of heat and moisture. Although the difference of density in this stratum may not be sufficient of itself to produce the upward motion at the level of the sea, yet the transfer of the same stratum up the side of a mountain would produce a precipitation of moisture, a liberation of latent heat, a vertical conducting column, and, in short, all the conditions necessary to a thunder storm. Hence the more frequent occurrence of this meteor in mountainous regions in the same latitude than on the shores of the ocean.

The statements of Mr. Bannister, as to the position and sound of the aurora, are in accordance with the testimony of some of the northern voyagers, who report having seen the beams projected on clouds and also against a hill at the distance of a few thousand yards. Indeed, it would appear, from an attentive consideration of all the facts relative to the aurora, that it consists of beams or discharges of electricity between the earth and the upper regions of the atmosphere, parallel to the dipping needle at the place of observation. These discharges, according to the theory, must, when a corona is formed, take place immediately around the observer, since in this case the corona is simply the vanishing perspective point of the parallel beams. We know that the appearance of the aurora at so small an altitude, and also the occasional emission of sound by the meteor, have been doubted, but we have never been able to infer from *a priori* considerations why the statement in regard to both of these phenomena may not be true. Late investigations leave no doubt as to the electrical nature of the aurora, and as the visibility of the discharges of this agent must depend upon the greater or less degree of the conductivity of the atmosphere, they may, in some cases, probably in dry weather, appear luminous down to the earth. The character of the sound is also similar to that which is produced by electricity.

In regard to the cold, it is a general observation that the thermometer sinks to the lowest degree during a perfect calm with clear sky. At this time the radiation from the earth is most intense, since all the local vapor is precipitated, and scarcely any obstruction is offered to the free passage of the rays of heat into celestial space. In this condition in a high latitude a wind which blows for some time, from any direction, is accompanied by a rise of temperature, since it must finally come, even across the pole, from a region of more moisture, though the water which it bears may be in a frozen condition, and thus produce a mistiness which would check radiation. Besides this, the wind from all points of more than one-half of the horizon, must come directly from a more southern quarter, and if it continues for a sufficient length of time, must needs have a higher temperature, from whatever direction it may come. Precisely at the poles all winds must be from the south.

The late Mr. Kennicott described to me a phenomenon which has also been mentioned by Sir George Simpson and other northern voyageurs; it consists of a rustling or crackling noise produced by the breath, when the temperature of the surrounding air is below -40° . He described it as producing a startling effect when first heard, the sound appearing to come from a point either to the right or left of the observer when in motion.

This effect is probably due to the sudden collapse of the vapor of the saturated air as it escapes from the lungs, and the consequent sudden reduction of the volume. That the condensation of the vapor may be sufficiently rapid in this case to produce a sound is scarcely surprising, when we consider the rapidity with which steam is condensed by water of the ordinary temperature in the operations of the steam engine.

HORARY VARIATIONS OF THE BAROMETER.

BY MARSHAL VAILLANT.

[Translated for the Smithsonian Institution, from the "Archives de la Commission Scientifique du Mexique," 1865.]

WHEN, in favorable weather, and especially under intertropical latitudes, we observe with attention the height at which the column of mercury stands in the barometer, it cannot long escape notice that this height undergoes, at different hours of the day, variations which pursue a quite regular course, and which are so well established that Humboldt (we believe) has said the elevation of the mercury in the barometric tube might serve as a timekeeper. This, in the domain of physics, is something analogous to what is presented to the botanist by the leaves or flowers of certain plants which open or close, droop or again become erect, at a particular period of the day, a fact which suggested to Linnæus the idea of his *horologium plantarum*.

The study of meteorological phenomena under the torrid zone presents a peculiar interest, and affords much more readily than in temperate zones a knowledge of the general laws which govern these phenomena. Between the tropics, in effect, they are disengaged from almost all the disturbing causes which, in our own climates, render their examination so difficult. It was under the equator that the horary variations were first recognized. Bouquer, La Condamine, and Godin observed them more than a century ago, (1736 and 1737,) when travelling together in South America. This phenomenon, to which is now given the more simple name of *diurnal period*, was described by Humboldt in the work which he published in 1807, and in which he has given the precise hours at which occur the maxima and minima of height of the mercurial column, as well as the extent of the oscillation. M. Boussingault has, by his own observations made at Guayra, (Colombia,) confirmed those for which science is indebted to Humboldt; and long calculations, embracing a large number of years, have resulted in mean quantities which place the existence of the diurnal period beyond doubt, even in latitudes as high as the north of France. "From facts ascertained by Bouvard, at the instance of Laplace, during the seventy-two months of the six years which elapsed from the 1st of January, 1817, to the 1st of January, 1823, it results that the mean diurnal variation at Paris is equal to $0^{\text{mm}}.801$; and also that the mean variation of each month is always positive."

I was not aware of the results at which Bouvard had arrived, when, availing myself of the tables furnished by the "*Annales de Physique et de Chimie*," I verified, to my own satisfaction, that the oscillations of the mercury at Paris were so perceptible as to be wholly incontestable, especially during the mild season. The meteorological tables, comprising the year 1825, I discussed entirely, and those for 1824 in part. I shall give further on, and in detail, the results at which I arrived; for the moment, suffice it to say, that we are not to expect to realize, under the latitude of Paris, deviations like those which are manifested under the tropics, where their extent surpasses two millimetres.

The column of mercury attains the maximum of its elevation about nine or ten o'clock in the morning, from one of which hours to the other there exists,

as it were, a solstice, or, in nautical phrase, a period of slackwater. After ten, the mercury begins to sink; at noon it is at a height which is very nearly the mean between the elevations of the day. From noon the column continues to sink, and reaches the minimum of height about three o'clock. From that hour till four of the afternoon we find a new interval of repose, the precursor of a change of sign in the movement of the mercury; and, finally, towards four or five o'clock, the column begins again to ascend.

About nine o'clock in the evening there is a second maximum in the height of the mercury, but the precise moment of this maximum is not yet well known. It would even seem that after an ascension, quite distinct and quite rapid, which takes place from five to nine or ten o'clock of the evening, the mercury does not absolutely cease to ascend, but that its ascensional movement, extremely slow and difficult to appreciate justly, still continues for an hour or two, or perhaps even three hours; after which succeeds a stationary interval of some length, and then a movement of subsidence, likewise very slow, and which may even continue during the first hour which follows the rising of the sun.

Such, in its principal circumstances, is the meteorological phenomenon to which has been given the name of *diurnal period*. Let us proceed to the explanation.

Let us suppose ourselves in the midst of a vast plain situated under the tropics. It is five o'clock in the morning, the air calm, the weather clear, the sun about to rise. It rises in effect, and its rays, at first tangents to the surface of the earth, glide over without warming it, and without communicating, so to speak, any heat to the air which is in contact with the ground. Presently, however, the luminous and calorific rays become inclined to the horizon, raise the temperature of the points upon which they strike, and consequently also the temperature of the air which touches the points warmed by the sun. These inferior strata of the atmosphere, from mere change of temperature, tend to dilate, to rise, and would in effect rise rapidly, were it not that in this ascensional progress they have to overcome the resistance which the superior strata oppose to their upward movement. It is necessary, therefore, that the air already heated should overcome the inertia of that which as yet is not heated—should displace and set it in motion. As long as the entire column, so to say, has not participated in this movement from below upward, the pressure is increased on the surface of the ground where the observer is supposed to be; it consequently increases also in the air which touches that surface, and hence upon the cistern of the barometer, which here fulfils not only the function of an instrument measuring the weight of the air, but also that of an instrument measuring the elasticity or resistance of a volume of air comprehended within certain limits of which the temperature continues to increase; in a word, our instrument is as well a manometer as barometer. And, let it be said in passing, it is because this double office of the instrument, which we owe to the genius of Pascal and Torricelli, has been too long overlooked that we have remained so much behindhand as regards the explanation of a great part of the phenomena of meteorology. But we return to the diurnal period.

In the struggle of which we have just now spoken, and which takes place between the atmospheric column and the part of the air which is in contact with the ground heated by the sun, now ascending more and more above the horizon, there is an instant when the resistance is a maximum, and when, consequently, the column of mercury attains its greatest height. Observation shows that this maximum occurs about nine o'clock in the morning.

There is nothing that need surprise us in this result of observation. On one hand, in warm countries, the greatest heat of the day prevails from ten o'clock in the morning or thereabouts; on the other hand, it is from eight to nine o'clock that the ascensional movement of the thermometer is most rapid. We have seen in Algeria, at the commencement of September, at the moment when we

struck our tents, which were pitched in the plain of Abd el Nour, between Constantine and Sétif, the outside of these tents covered with crystals of ice, and the thermometer laid upon the canvas has descended by at least half a degree below zero. The sky was of the purest blue and the air of wonderful transparency. The sun arose in full radiance, and before eight o'clock the heat had become as oppressive as it was the evening previous on our arrival at the bivouac. If I remember rightly the thermometer stood thus early at 27° centigrade, and it scarcely reached a higher point during the whole day.

From nine till ten o'clock of the morning, there is, as we have said, an equilibrium between the force which tends to communicate an ascensional movement to the column of air, and the resistance which that column opposes to the movement.

From ten o'clock onward, the ascensional force decidedly prevails; the inertia has been overcome, motion from below upward has been imparted to the whole column, and there results, as it were, a suction or partial vacuum over the surface of the earth, and consequently on the cistern of the barometer. The mercury sinks in the tube, not because there is less air above this cistern, but because that air ascending vertically has lost a portion of its gravity and of its elasticity.

The fall of the mercury, which commenced about ten o'clock, continues till three: at which hour, as observation proves, it is completed, and the barometer now indicates a minimum. There is nothing in this which does not correspond with what might easily have been foreseen. The heat begins or will soon begin to diminish; the solar wind or trade wind is about to lose its velocity—a velocity which in itself, also, has the effect of diminishing the pressure of the air on the barometer. Everything concurs therefore to produce the descending movement of the column of air, a movement which, it may be said, is rendered visible to all who observe what occurs with regard to smoke or the corpuscles suspended in the air, as soon as the sun begins to be inclined towards the horizon. Instead of mounting, as they do in the middle of the day, they remain on the surface of the ground. The perfume of flowers, instead of being dissipated in the atmosphere, is condensed and becomes stronger and more penetrating. Everything, in effect, manifests a movement of the air towards the earth; the clouds sink lower, the mists occupy the valleys, &c.

The surface of the earth becoming cooler towards four or five o'clock, a downward movement of the whole corresponding atmospheric column ensues; the air acquires a certain velocity, and this active force is represented to the sight by an ascension of the mercury in the barometer. From observation the metal is found to attain a new maximum of height about nine o'clock in the evening, twelve hours after the former maximum in the morning. But, as has been already said, there is some uncertainty about the precise instant of this second maximum, an uncertainty which may be explained by the slowness with which the temperature sinks during the night. The subsidence of the thermometer, from the time when the sun begins to descend towards the horizon to that of its setting, and even a little after, is quite sensible, but afterwards, although the earth's surface continues in reality to grow cooler, it is constantly brought into contact with successive volumes of the descending air which has not yet lost all the heat acquired during the day, and through the effect of this contact there is established, not indeed a complete equilibrium in the temperature, but, at least, a partial compensation for the effect of the radiation of the surface during the night.

The ascension of the mercury in the barometer, from four or five o'clock in the evening to about nine, would be certainly more rapid and extended if the condensation of the air in the strata next to the earth did not take place simultaneously with another very common phenomenon, which in hot countries acquires considerable proportions; I speak now of the evening vapors and the dew. The former begin to manifest themselves in intertropical regions as early as the fourth hour of the afternoon, and observant travellers even report that there are days on the Senegal when the phenomenon becomes perceptible within two

hours after the sun's passage of the meridian. These vapors, which change their name and become dew in the morning, are so abundant under the tropics as to indicate a large conversion of watery vapor into liquid water. Now this water, when it was in a state of vapor, exerted on the barometrical cistern a pressure additional to the proper pressure of the air, and contributed, in a certain measure, to maintain the mercury at the height which it had attained; but if, afterwards, and when the air is about to descend because of its refrigeration by contact with the earth, the watery vapor is converted into cloud, (*serein*,) and no longer occupies more than a very small fraction of its primitive volume, this progressive diminution of the quantity of water which was in a state of vapor at the moment when the air began to assume a descending movement, cannot but operate as a lessening of the pressure which the descent of the column of air exerts on the barometer.

It would be difficult to estimate with any precision what part, as regards the ascension of the mercury in the morning, should be assigned to the evaporation of the dew, and equally so to estimate how much the maximum of the evening should fall below that of the morning from the effect of the production of the evening vapors. The difficulty is the greater because here we are to consider not only a weight to be added to the weight of the atmospheric column or to be deducted from it, but chiefly because when dew is in question, account is to be taken of the elasticity which the vapor of water acquires, as soon as it is formed, by its mixture with the air already warmed by contact with the surface of the earth. Nothing, however, forbids our making a supposition, and this I have done by inquiring how much a stratum of dew, represented by a height of two millimetres of water, (a supposition, I think, involving nothing excessive,) would cause the barometer to ascend, by the fact alone of its vaporization? The result has been found to be a height comprised between one and two-tenths of a millimetre. If we allow an effect of equal extent, but in an opposite direction, for the diminution of the mercurial column at the evening maximum of nine o'clock, there will result three-tenths of a millimetre, or very nearly so, as the quantity by which the maximum of the morning would surpass the maximum of nine o'clock in the evening; admitting, as has been just supposed, that the dew of the morning, like the damps of the evening, represents a stratum of liquid water two millimetres in height.

It was stated at the commencement of this article that, in the course of 1826, I took occasion to discuss the meteorological tables of the whole of the year 1825 and of a part of 1824, as they had been given in the *Annals of Physics and Chemistry*. I distributed the days first into categories indicated by the state of the sky, and next into categories determined by the direction of the wind which prevailed during these different days. Let us first observe to what result the former operation led:

Eighty days of a sky entirely overcast. The mean height of the barometer, at the moment of the maximum of 9 o'clock in the morning, was.....	mm. 756. 82
The mean height, at the moment of the maximum of the evening, was.....	756. 20
Difference	0. 62
One hundred and sixteen days of a cloudy sky. Maximum of 9 o'clock in the morning.....	758. 28
Maximum of 9 o'clock in the evening.....	757. 72
Difference.....	0. 56
Forty-eight days of a sky perfectly clear, or presenting only small clouds, white and thin. Maximum of the morning.....	759. 87
Maximum of the evening.....	758. 53
Difference.....	1. 34

From these differences it will be seen that, even for the overcast and cloudy days, which show the slightest disparities between the maxima, as might readily be foreseen from the explanation which we have given of the phenomenon of the diurnal period, these disparities still exceed by much the three-tenths of a millimetre to which we were led by our supposition of a stratum of two millimetres of water undergoing conversion into vapor, and conversely.

The number of days to which our calculations were extended was but 244; the rest of the year was left out of view, because the 121 days of which it consisted found no well-defined place in the categories we had adopted.

The researches which follow comprise the 365 days of the year, being distributed in the classification according to the direction of the wind:

Winds.			mm.
N.	75 days.	Mean height of the maximum of 9 o'clock of the morning.....	761.40
N.NW.		Mean height of the maximum of 9 o'clock of the evening.....	761.36
N.NE.			
		Difference	0.04
Wind.			
NE.	27 days.	Mean height at 9 in the morning	762.36
		Mean height at 9 in the evening.....	761.13
		Difference	1.23
Winds.			
E.	30 days.	Mean height at 9 in the morning.....	758.29
E.NE.		Mean height at 9 in the evening.....	757.18
E.SE.			
		Difference	1.11
Wind.			
SE.	12 days.	Mean height at 9 in the morning.....	753.59
		Mean height at 9 in the evening.....	752.48
		Difference.....	1.11
Winds.			
S.	61 days.	Mean height at 9 in the morning.....	755.41
S.SE.		Mean height at 9 in the evening	753.27
S.SW.			
		Difference.....	2.14
Wind.			
SW.	61 days.	Mean height at 9 in the morning.....	756.24
		Mean height at 9 in the evening.....	754.72
		Difference.....	1.52
Winds.			
W.	58 days.	Mean height at 9 in the morning.....	756.69
W.SW.		Mean height at 9 in the evening.....	756.24
W.NW.			
		Difference	0.45
Wind.			
NW.	41 days.	Mean height at 9 in the morning.....	759.10
		Mean height at 9 in the evening.....	759.02
		Difference	0.08

The preceding figures impart their instruction. We confine ourselves at present to the remark, already made in reference to the distribution of days according to the state of the sky, that the difference of the morning and evening maximum is always in the same direction, and that, if we except the two cases

of winds whose course approximates to the north and northwest, the differences of the means generally much exceed the three-tenths of a millimetre yielded by the supposition of a stratum of water two millimetres in height. In observing with what regularity the phases of the phenomenon of the diurnal period present themselves even in the latitude of Paris, we can feel no surprise at the course, worthy of being styled chronometric, which the same phenomenon exhibits in tropical regions, and which led Humboldt to say that "no atmospheric circumstance—neither rain, nor fair weather, nor wind, nor tempest—affects the perfect regularity of these oscillations under the tropics; but that they subsist alike at all times and in all seasons."

Humboldt has given the law of these variations under the torrid zone; designating by Z the mean height of the mercury for the whole day, or, what is the same thing, the height at mid-day, we have:

The oscillation at 9 o'clock in the morning, equal to.....	$Z + 1^{\text{mm}}.1280$
That of mid-day.....	Z
That of 4 o'clock in the evening.....	$Z - 0 \quad .9024$
That of 11 o'clock in the evening.....	$Z + 0 \quad .2256$
And, finally, that of 4 in the morning.....	$Z - 0 \quad .4512$

For, as Humboldt tells us, he had observed that the ascensional movement, which is manifested from five o'clock in the evening, and which attains its apparent maximum towards nine, ten, or even eleven o'clock in the evening, ceases towards this last hour, and is replaced by a very slow fall of the mercury, a fall which is continued until about four o'clock in the morning, when it is at $0^{\text{mm}}.4512$ in relation to the mean height of the day.

The explanation which we have given of the diurnal period very readily accounts for this last phase of the phenomenon. There must, in effect, be a moment when the column of air, which is condensed on approaching the surface of the earth, has lost almost all its velocity of descent, and when, consequently it exerts on the barometric cistern no other action than that which results from its weight. There is no reason, on the other hand, why dew should cease from forming and from replacing the watery vapor which pressed upon the barometer, by liquid water, which exerts no pressure on that instrument. There may well, therefore, be a subsidence of the mercury, having its point of departure in the neighborhood of midnight, and continuing slowly until the moment when the morning sun begins to warm the surface of the earth and convert the dew into vapor.

In a very remarkable memoir, in which Ramond has treated of the question of the horary variations of the barometer, we find a table which gives the results of 2,065 observations made at Clermont, a table which we here present, still retaining the notation Z for the height of the barometer at noon, or the mean height of the day:

	Morning.	Noon.	Afternoon.	Evening.	Depression.	Ascension.
Spring.....	$Z + 0^{\text{mm}}.39$	Z	$Z - 0^{\text{mm}}.72$	$Z + 0^{\text{mm}}.33$	$1^{\text{mm}}.11$	$1^{\text{mm}}.05$
Summer....	$Z + 0 \quad .32$	Z	$Z - 0 \quad .56$	$Z + 0 \quad .33$	$0 \quad .88$	$0 \quad .89$
Autumn....	$Z + 0 \quad .33$	Z	$Z - 0 \quad .41$	$Z + 0 \quad .47$	$0 \quad .74$	$0 \quad .88$
Winter....	$Z + 0 \quad .37$	Z	$Z - 0 \quad .36$	$Z + 0 \quad .36$	$0 \quad .73$	$0 \quad .72$

It would result from this table that, in our climates, the depression of the day is reduced to the half of that which is observed at the equator. Another consequence to be drawn from the same table would be this: that, with us, the ascension of the evening is very nearly equal to the depression which preceded it, while under the tropics these quantities differ from equal to double.

But here it is proper that an important remark should be made: the above table, as well as those which precede it, is the result of observations made in France at the same hours of the day, but at periods of the year wholly different.

It is readily understood that, under the tropics, where the duration of the days varies so little, the barometrical heights should be taken at moments always equally distant from mid-day, and therefore always equally distant from the rising and setting of the sun, or at least very nearly so. Such are the observations made by Humboldt, M. Boussingault, &c. But, in France, how are we authorized to collate and compare the effect of the warming of the earth's surface by the solar rays, *in summer*, at nine o'clock in the morning, when the sun is already five hours high, with that which has been produced at the same hour of the morning, *in winter*, when the sun is scarcely above the horizon and its rays reach the surface of the earth only through thick clouds or mists? There is evidently no comparison possible between observations made under conditions so different. It would seem that if the maximum of the morning corresponds, under the torrid zone, to eight or nine o'clock, as Humboldt has verified, this maximum will, with us, occur in summer, when our days are long, at about six o'clock. Further north it would be at five o'clock, while near the pole there would be no maximum either morning or evening. In the winter, on the contrary, the maximum would, in our latitude, occur at about ten or eleven in the morning and be necessarily not very obvious. In high latitudes, where the sun scarcely shows itself, all would be confounded, and the diurnal variation, if not wholly absent, escape the notice of observers by reason of its diminutive proportions. Continuous observations, directed to a verification of the suggestions thus thrown out, could not fail to be of much interest, especially if it were practicable to make them with a registering instrument and a barometer filled with a liquid much lighter than mercury.

The inquiry has sometimes occurred to me whether there might not be found in the experience of our every-day life some simple facts which would serve to illustrate and confirm the above theory on the diurnal period, and it has seemed to me that what takes place in our ordinary chimneys has much analogy with the oscillations of the barometric column. Let us suppose the fire to have been extinct for some time, and the air of the chamber, like that of the chimney, nearly motionless. Let fire be now supplied on the hearth; the lower air will become heated and have a tendency to rise, but it is necessary that it should make for itself a way in the column which occupies the body of the chimney, that, so to say, it should displace this whole column and set it in motion. The struggle is of more or less duration; sometimes the warm air, not being able to rise quickly enough, diffuses itself in the chamber; the chimney *smokes*. As long as the struggle continues there is a repression of the air, and consequently an augmentation of pressure in the body of the chimney. Here we have the first phase of the diurnal period; it corresponds to the warming of the surface of the earth by the newly risen sun. By and by the moment arrives when the pressure of the air in the body of the chimney attains its greatest intensity, corresponding to the maximum of eight or nine o'clock in the morning. After this, all the air being finally put in motion and the force of inertia overcome, the tension diminishes, and through the velocity acquired, this tension in the tunnel of the chimney must become even inferior to what it was before the kindling of the fire on the hearth, representing the period from nine or ten o'clock to midday and to even three o'clock in the afternoon.

Suppose now that after having kindled a brisk fire and established a strong draught, we cease to supply fuel; the draught will diminish, the air will ascend less rapidly, the pressure will augment in the body of the chimney, and if there were a barometer therein, the mercury would ascend in the tube. At length, when the fireplace has become altogether cooled, the entire column of air will acquire a movement from above downward, and will exert a pressure on the hearth; it is what often occurs in our dwellings during summer, when great heat prevails. The external air, which is warmer than that of the chamber, becomes cooled in penetrating from above, descends along the tunnel and throws down

the chimney-screen if not well secured in its position. The odor of soot pervades the apartment, distinctly indicating the presence of a descending current of air in the flue of the chimney. Now, it is this descending movement of the air in the chimney which represents, in the diurnal period of the barometer, the phase commencing at three or four o'clock in the afternoon and continuing until after midnight.

Is it not a curious thing to find, in what occurs at the fireside of the most simple dwelling, so complete an analogy with all the circumstances of the phenomenon, apparently so complicated, which is called the *diurnal period* of the barometer? Need we hesitate once more to repeat that it is the presence or absence of the sun, the warming or cooling of the earth which thence results, which is the sole cause of all meteorological phenomena, from the ascent and passage of a soap-bubble to the most fearful tempests? Let us carefully observe, then, these effects of heat and cold, not by studying the phases of the moon and the tides which it may produce at the limits of our atmosphere, not by considering the stars, but by attending to what passes around us on the surface of the earth.

Biot has said, and M. Poey has recently repeated the remark, that it is necessary to commence our study of meteorology from above; we are not at all of that opinion. Almost all the phenomena of meteorology—rains, snow, hail—are accidents solely due to differences of temperature; they are produced at the surface of the earth, and it is they which occasion the disorderly movements of the lower strata of the atmosphere; a little above these there is only a blue or black sky, absolutely a stranger, let us believe, to all those phenomena which occupy so large a space in our own experience.

LETTER OF MARSHAL VAILLANT, ON THE FOREGOING THEORY, TO M. CHARLES
SAINTE-CLAIRE DEVILLE, MEMBER OF THE INSTITUTE.*

I have attentively read your memoir, or, as you term it, monograph, *On the Barometric Phenomena of the Antilles and Neighboring Countries*. The following are some of the reflections which that examination has suggested to me.

The observations which you report confirm the truth of the theory which I have developed in my note on the horary variations, and I have no doubt that observations which will be made in the future, and for which, I trust, that theory will be accepted as a guide, will lead to the most satisfactory confirmation.

You are right in saying that *the different elements of the total oscillation undergo the constant influence of the solar heat*. Yes, it is to the influence of that heat that the ascensional movement of the mercury in the barometer is due, in consequence of the inertia which the air and watery vapor mingled together oppose to the ascension which the heat communicated tends to impress upon them; and it is also to the diminution of the calorific effect on the air and watery vapor, and to the inertia which retards their being put in motion, that is due the subsidence of the mercury in the barometric tube. Inertia, that force which is ever and everywhere encountered, has been, perhaps, rather too much neglected by the meteorologists.

The cause being known, or at least suspected, we can calculate its effects and proceed in advance of direct observation; this will come afterwards to the support of the theory. Thus, as you very properly say, *the phenomenon of the diurnal variation, at the level of the sea, considered in the establishment of the tropical hours or in the extent of the oscillation, is manifestly connected with the*

* This letter forms a sequel to the previous article, *On the Horary Variations of the Barometer*, and was designed to furnish to the explorers and correspondents of the scientific commission of Mexico indications respecting the direction to be given to their barometrical observations.

causes which influence, as well the distribution of the annual mean temperatures as the distribution of the sum of the temperatures over the different hours of the day.

Let us go a step further, if you please, and state more precisely the effects due to this cause, inasmuch as we know it: the greater the heat, (the habitual heat due to the latitude,) the greater should be the extent of the oscillations; the warmer the season in comparison with other seasons of the same year, the greater will be the amplitude of the oscillations during that warm season; the more rapid the ascension of the thermometer during the day, as, for example, in certain countries of low latitude, where, in a few hours, there is a transition from a temperature below zero to a heat of twenty-five or thirty degrees above, the more considerable will be the oscillation; the clearer the sky and more transparent the air, the more rapidly will the earth be disposed to grow warm under the action of the solar rays, and the greater and more rapid will be the oscillation.

For the part of a continent having its general slope directed toward the rising sun, the ascent of the mercury in the morning would be more rapid, and it would attain a limit which it would not reach if that part of the continent were simply level or nearly so. For the same tract of country, thus strongly inclined to the east, the fall of the mercury in the afternoon would be also much greater than for a horizontal region, since what would be gained from the inclination of the surface in the morning would be lost in the evening.

All these effects are influenced also by the alternation of the breezes of the land or water, if the position is near the shore of an ocean, great lake, &c. And since these breezes, according as they arrive from the east or west, counteract or favor the calorific action of the sun on the surface, they would differently modify the oscillations of the mercury in the barometer. This your *monograph* conclusively shows. Nor would the direction of the trade-winds, on their part, fail to exert an influence on the amplitude of the phenomenon; not so much indeed as altogether to mask it, but sufficiently to extenuate certain details of time and extent, which theory alone could then supply and place in relief. While the theory here presented seems to account satisfactorily for the horary variations in an extensive and level plain, it would lead us to expect that, since the degree of calefaction through the presence of the sun is the cause of these variations, the latter will be proportionately less as the former also is less and the plain more elevated above the level of the sea; in other words, the greater the altitude of the country the smaller will be the oscillation of the mercury. This prevision of the theory is confirmed by the observations reported in the ninth page of your memoir.

The horary oscillation for a small island lost in the bosom of a vast ocean must be difficult to recognize and measure, the effects of the heat communicated to the soil being, as it were, absorbed and disappearing in the general movement of the air on that ocean. An analogous result, though even less distinct, would be produced in the case of a peak isolated in the midst of a great plain.

In recapitulation, I would say: if the phenomenon of the horary variations has its cause, as I am satisfied is the case, in the inertia of the air, that is to say, in the reluctance with which it enters into motion, whether upward or downward, when the surface on which it rests begins to grow warm or cold, observation ought to lead to the verification of the following facts:

The warmer a country in consequence of its latitude, the more decided will be the oscillations of the barometer, and the more feeble in proportion to the elevation of the country above the sea. Their regularity, that is, their symmetry in relation to the meridian, will be modified through the aspect of the country as turned towards the east or west, by the manner in which it presents itself to the general current of the trade-winds, the breezes of the land or sea, &c.

Beyond the intertropical zone, the hours to be chosen for the observations should vary according to the seasons. The extreme hours should be more remote from midday in spring and summer, and should be nearer to it in autumn, but especially in winter.

The amplitude of the diurnal oscillations of the barometer will diminish in proportion as we advance towards the higher latitudes; it will very nearly vanish in countries where the sun no longer appears above the horizon, as in those also on which it constantly shines during six consecutive months.

The amplitude will diminish when the sky is overcast or cloudy, but the oscillations would not on that account cease altogether; for if fogs or clouds intercept the view of the sun from the earth, they still receive the rays of that luminary on their upper surface, which must consequently have its temperature raised, as would be that also of the air which touches it, though in a less degree than is the case when the rays of the sun strike the earth itself.

Beyond the zone for which the length and heat of the days are, so to speak, invariable, it should be in the warmest month of the year that the diurnal barometric oscillation is most considerable: hence we infer that there is a maximum for the year. But there is difficulty in admitting a monthly maximum or minimum. The existence of the latter, if observation should verify it in certain localities, must depend on special circumstances, from which it will be easy, we think, to disengage the phenomenon itself. As this phenomenon, however, according to what we have so often said, is in an especial manner connected with the temperature, there would be no positive ground for surprise if the months which comprise the spring and summer were found to have each a minimum at the commencement and a maximum at the end; while, for the months constituting the autumn and winter, there should be a maximum in the first days and a minimum in the last days of each of those months. But, in our high latitudes, and with all the causes which occur to derange the regularity of the course of our seasons and their temperatures, it will, perhaps, be very difficult to establish by direct observations what I am disposed to call the differentials of the phenomenon of barometric diurnal oscillations.

Permit me, in conclusion, to advert to a great variance which exists between us. In several passages of your work you speak of *variations in the weight of the atmosphere*, and you seem inclined to connect these variations of weight with the barometric diurnal oscillations; I might cite specially the last paragraph of page 32, in which you say: "We have inquired how it is that, in the same place, the weight of the atmosphere varies in the day according to the hours, and in the year according to the months." For a long time I have been opposed to this mode of interpreting the horary variations of the barometer; these, in my opinion, are wholly independent of the proper weight of the atmosphere, so that, on the supposition of the weight of the column of air remaining absolutely the same for several months, the diurnal variations would not the less be produced and within the same limits. They are the effect of the augmentation or diminution of the volume and elasticity of the air, in consequence of the heating or cooling of that air in contact with the surface of the earth; but this has nothing in common with the weight of the air simply as a gravitating body. I give but little credence to waves produced at the upper limit of our atmosphere; but had these waves several kilometres of altitude the phenomenon of horary variations would not be materially affected; they might slightly mask it, perhaps, but would neither deprive it of its form or its importance.

It is this unfortunate confusion of the weight and the action or elasticity of the air, as also of the weight and elasticity of the watery vapor diffused in the atmosphere, which renders the language of the barometer so critical a matter to interpret. This instrument, as regards the indications which it gives us and the consequences which we draw from them, is much more a *manometer* than a *baroscope*, as, at its origin, it was sometimes called. I hope to be able to recur to this subject hereafter, and in the mean time conclude by saying that, in the computation of heights by the barometer, there are circumstances in which it will be necessary to take account of the horary variations, at the risk of neglecting an element of exactness.

APPENDIX TO THE FOREGOING.

BY PROFESSOR HENRY.

Without wishing in the least degree to detract from the merits of the foregoing interesting exposition of a phenomenon which has long occupied the attention of meteorologists, I think it due to the memory of the late Professor Espy to state that the essential principle of the explanation was given by him in the first volume of the Journal of the Franklin Institute, of Philadelphia, in 1828. M. Vaillant has, however, without knowing of the previous explanation of Professor Espy, given a more full exposition of the phenomenon by the introduction of the effect of the variation in the quantity of vapor in the atmosphere. The following is an extract from the article published by Mr. Espy :

“ The true cause of this phenomenon is the expansion, and, of course, rise of the atmosphere by heat, and the contraction and consequent fall of the atmosphere by cold. Suppose just before sunrise in the torrid zone, the temperature of the air neither increasing nor diminishing, and of course the air neither expanding nor contracting, the barometer stands at thirty inches; now when the sun rises at six o'clock the air will begin to be heated near the surface of the earth, and of course, by its expanding, will elevate the superincumbent atmosphere; and this by its inertia will react on the air below, and thus press harder on the mercury of the barometer than if it were at rest, and the more rapidly it is forced upwards the greater will be its reaction downwards, and of course the more will the barometer be affected. It is manifest that the most rapid increase of heat and rarification of the air will take place somewhere between sunrise and three o'clock, when the heat is the greatest, and this will evidently be near ten o'clock, at which time the barometer will stand highest. Though the heat is still increasing, and of course the air expanding, yet the rapidity of increase after this hour is not so great, and therefore the barometer will begin to fall; and at the moment of greatest heat, when the air is neither expanding nor contracting, the mercury will again stand at thirty inches high. But now the air begins to contract from cold, and the mercury will therefore continue to descend, and the rapidity of the descent will be in proportion to the rapidity of the contraction from cold. Perhaps this effect may be more clearly understood by imagining an extreme case. Suppose the lower strata of atmosphere suddenly annihilated, the mercury of the barometer would be relieved from all pressure for a moment, and fall down into the basin; and if annihilation removes all pressure from the mercury, a contraction of the lower strata by cold will remove some pressure; therefore the mercury will fall; at the moment, therefore, of a most rapid decrease of heat, which is probably near sunset, the mercury will stand lowest, and will be below the height of thirty inches, at which I have supposed it to stand when the air is neither expanding nor contracting. The mercury will now begin to rise, for the rapidity of contraction diminishes from this moment, and the upper parts of the air are permitted, more and more, to press upon the lower with their whole weight; and even when the contraction ceases below, the upper parts, having acquired a velocity downwards, are inclined to continue that motion, and thus by their momentum will press upon the lower parts with a force greater than their natural gravity, and thus the barometer will rise above thirty inches, at which height it was supposed to stand when the air was neither contracting nor expanding. This effect must take place some time in the night, and it seems probable, a priori, that it would be about ten or twelve o'clock. Now, as the mercury at this hour stands higher than it does by the natural weight of the air

at rest, it is plain that it will begin to fall as soon as the force of the superior parts of the air begins to spend itself on the inferior, and when all motion downwards has ceased, the mercury will again be pressed by the natural weight of the atmosphere, and so stand at thirty inches. In this situation the sun will rise upon it, and the same fluctuations will be renewed.

“J. P. ESPY.

“PHILADELPHIA, *March 1, 1827.*”

ON THE FORMATION OF ICE AT THE BOTTOM OF THE WATER.

BY M. ENGELHARDT, DIRECTOR OF THE FORGES OF NIEDERBRONN, (LOWER RHINE.)

Translated for the Smithsonian Institution from the "Annales de Chimie et de Physique," Paris, 1866.

THERE are not a few natural phenomena which are better known to the people than to the learned; and the reason of this is simple. The man of the people, always in quest of the means of bettering his condition, observes a phenomenon not with a view to investigate its cause, but to derive from it some practical benefit. The savant, on the contrary, withdrawn from nature in the meditations of the closet, usually recurs to practical experience only when he is led to do so by the speculations of theory, and often refuses to recognize the facts which do not square with his preconceived ideas.

Hence it has happened that sundry physicists, Nollet, Mairan, and others who have followed them, have denied a phenomenon well known to all the watermen and frequenters of the great rivers of the centre and north of Europe: I mean the ice which, in severe frosts, forms at the bottom of rivers, and which the Germans call *grundeis*, ice of the bottom.

The Rhine and the Danube, rivers with a rapid current, do not freeze like the Seine by being covered with a plane and uniform stratum; they bear along large blocks of ice which cross and impinge upon one another, and becoming thus heaped together, finally barricade the river. It is a grand spectacle, when the Rhine is thus charged, to see these countless drifts adjust themselves in their relative position, where they unite by congelation, and convey the idea of the fall of some mountain which has covered the plain with rocks of every dimension. But it is not this accumulation of ice drifts in the Rhine which is of itself the cause of danger; it is, on the contrary, the débâcle or breaking up which is often productive of calamitous consequences. When this débâcle commences in the upper part of the river, above the point where the latter is completely frozen, the masses of ice, drifting with the current and unable to pass, are hurled upon those already soldered together; thus an enormous barrier is formed which the water, arrested in its course, cannot pass over, and hence overflows to the right and left, breaking the dikes, inundating the plains, and spreading devastation and suffering far and near.

The disasters caused by the débâcles of the Rhine have taught the riparian inhabitants to observe attentively the facts which may serve them as a prognostic, and put them on their guard against the irruption of the ice. It is thus that they have been led to observe the *grundeis*—that is to say, the ice formed at the bottom of rivers, for it is this ice which, in becoming detached from the bottom and rising towards the surface, unites itself to the under surface of the masses already in place, and by further embarrassing the discharge, exposes the country to inundation.

Being intrusted with the direction of important works, I felt it the more incumbent on me to observe with care the daily phenomena which might have an influence on our labors, and it is from having followed them with great attention that I have found, as I believe, the true cause of the presence of ice at the bottom of rivers.

Let us first consider the phenomenon historically as we find it related by

Horner in the *Dictionnaire de Physique* of Gehlen, 111, 127; by Arago, (*Annuaire du Bureau des Longitudes pour 1833*), and by L. F. Kœmtz, (*Dictionnaire Encyclopédique des Sciences et des Arts*, published by Ersch and Gruber.)

The physicist Plot appears to have been the first to make mention of the ice formed at the bottom of rivers, in his "Natural History of Oxfordshire," 1705. Hales, in his "Vegetable Statistics," London, 1731, mentions the existence of ice at the bottom of water as having been ascertained by bargemen, and reports his own observations. He had seen ice of spongy consistence form at the bottom of the river, and remarked that "the water must be in motion in order to have sunk to zero throughout its mass," and he pointed out the influence of asperities and projecting bodies on the formation of this ice.

Nollet, in 1743, thought the phenomenon incompatible with theory, and completely denied it. Mairan and several other physicists of the epoch shared his opinion.

Nevertheless, Desmarest, in the *Memoirs of the Academy* for 1776 and the *Journal de Physique* for 1783, t. iii, verified anew the formation of ice at the bottom of rivers; it was afterwards confirmed by Braun, *Hanvörisches Magazin*, 1783, and *Journal de Physique*, 1788; also by Leslie and by Garnet. In 1806 observations were made by Knight on the Teine. Stencke, chief of the pilots of Pillau, (Prussia, on the Baltic,) reports in Gilbert's *Annales de Physique*, xx, 332, that, on the 9th of February, 1806, at a temperature of $-32\frac{1}{2}$ degrees of Fahrenheit = -35.11 degrees centigrade, chains 12 feet in length surrounded with ice were brought to the surface of the water from a depth of 12 to 15 feet, as well as a large cable 30 toises long, which had been immersed for a considerable time.

On the 11th of February, 1816, the abbé Branthoma, then professor of chemistry in the Faculty of Sciences of Strasbourg, again verified the formation of ice at the bottom of the bed of the Rhine, in presence of the engineers of bridges and roads. The temperature of the air was at 12° ; the Rhine, at the place where the ice formed, was about 2 metres in depth. The ice was seen to form very perceptibly at the bottom of the water, not only at this point, but at many others. The thermometer was at zero at the surface of the water, while another thermometer introduced into the ice was equally at zero. When taken from the water the ice had the same temperature, was very porous, and formed of interlacing crystals. Towards 10 o'clock the ice, having become more compact, was detached from the bottom, and rising floated on the surface. (*Bibliothèque Universelle*, xvii, p. 304.)

In 1827, Merian observed, at Bâle, ice at the bottom of the water in the canal of Saint Alban. In the same year Hugi made a great number of observations on the spongy ice formed at the bottom of the Aar, near the bridge of Soleure. The very cold winter of 1829 led to the first observations which I made at Zinsweiler, (Lower Rhine,) and of which I gave notice, the same winter, to the Society of Natural History of Strasbourg, then recently instituted.*

M. Fargeaud, professor of physics, published, in 1830, his thesis on caloric, in which he communicated his observations on ice thus formed, in the following terms: "On Sunday, January 25, 1830, I happened to be present with several of my pupils on the bank of the Rhine, opposite to Kehl. A thermometer, suspended to a tree, indicated 11° Reaumur; while another, placed in the snow at an inch from the soil, stood at nearly 6° Reaumur. Notwithstanding this great degree of cold, the water which flowed in the moat of the citadel was frozen only on its borders. That part of the bed of the Rhine which by an embankment of sand was sheltered from the wind, was also destitute of ice. At the same time the thermometer resting on the surface of the water rose rapidly to

* This society was founded in December, 1828, by certain members of the Society of Sciences, Agriculture and Arts of the Lower Rhine, viz., MM. Boeckel, Duvernoy, Ehrmann, Engelhardt, Fargeaud, Lauth, Nestler, Silbermann, and Voltz.

zero, and when plunged one or two feet deeper ascended to $3\frac{1}{2}$ above zero. Proceeding to the end of the embankment, at a short distance from a very rapid current, and in a sort of inlet where the water had at first but little depth, I saw all the pebbles covered with a kind of transparent moss from an inch to an inch and a half in thickness, composed of crystals of ice combined in every manner; a true crystallization in effect, promoted by the presence of the pebbles, and in all respects similar to that which is furnished by certain salts in our laboratories. The thermometer indicated zero at this point, as well towards the border as at a depth of several feet, in the most rapid part of the current. We were presently able to distinguish in this latter part, at a depth of about five feet, large masses of this spongy ice into which an oar could be thrust with the greatest facility, and portions which were thus detached were found to be exactly similar to innumerable fragments of ice which were then drifting in the river."

Hence M. Fargeaud concludes: "1st, that in rivers having a greater or less depth and no current the water will long maintain a temperature above zero, whether from the warmth of the ground or the small conductive capacity of the water, or, in fine, from the very fact of the species of equilibrium which results from the maximum of density. When such a river freezes, the ice must of necessity form at the surface; 2dly, that if, on the contrary, the current be very rapid, the whole mass must be brought to zero; 3dly, that the water thus brought to zero may preserve for some time its liquid state, especially on a bottom of ooze or sand, but that in general it will be disposed to crystallize, and will in fact crystallize wherever any cause shall contribute to produce this change of condition."

M. Fargeaud then adds, in allusion to the facts which I had stated in his presence in the Strasbourg Society of Natural History, "that he had learned that a superintendent of the forges of the Vosges, in order to prevent the ice from forming at the bottom of the stream which supplies his works, had caused the stones and other extraneous bodies found therein to be removed every year." My experiments were afterwards cited by Arago and other physicists with simple reference to a "master of the forges of the Vosges."

Berzelius, in his *Compte Rendu* for 1829, also speaks of the ice at the bottom of rivers; he had himself seen the phenomenon but once. He reports the observations of Hugi and a letter of M. Reaucourt, published in the *Globe* of the 17th February, 1830.

Arago, in the *Annuaire du Bureau des Longitudes* for 1833, relates all that was then known respecting ice at the bottom of the water, and gives the following explanation of it: "Who does not know that in order to hasten the formation of crystals in a saline solution, it is sufficient to introduce into it a body either pointed or of uneven surface; that it is especially around the asperities of bodies that crystals take their origin, and receive rapid accretions? The same, we may be assured, is the case with the crystals of ice.

"But what we have just said," he continues, "is not precisely the process in the congelation of rivers; this will scarcely be suspected, I think, if we remember that the congelation never occurs on the bed itself except where rocks, pebbles, pieces of wood, plants, &c., exist. Another circumstance which seems capable also of playing a certain part in this phenomenon is the movement of the water. At the surface this movement is very rapid and sudden; it must, therefore, tend to obstruct the symmetrical grouping of the needles in that polarized arrangement, without which crystals of whatever nature acquire neither regularity of form nor solidity; it must often break the crystallized nucleus, even in its rudimentary state.

"Movement, that great obstacle to crystallization, if it exist at the bottom as at the surface of the water, is there at least greatly diminished. It may be supposed, therefore, that its action will only conflict with the formation of a regular or compact ice, but will not prevent in the end a multitude of small filaments

from uniting with one another confusedly, in such a manner as to generate that kind of spongy ice through which M. Hugi so readily thrust the oars of his bateau.

"Having reached this point, the reader will, perhaps, ask why I do not offer the preceding as the complete explanation of the formation of the *grundeis* of the Germans, the bottom ice of our watermen. The following is my answer :

"We are still in want of observations to prove that nowhere does this sort of ice show itself until the whole mass of the liquid has descended to zero. It is not certain that the small needles of ice floating on the liquid, of which M. Knight makes mention, and which may have acquired, at least at their surface, a temperature much below zero, do not play an important part in the phenomenon, and one which I have wholly neglected ; that, for instance, of imparting coldness to the pebbles which cover the bed of the river when the current carries them down to it. Might it not be possible even that these floating filaments were the principal elements of the future spongy ice ?"

In 1836 Gay Lussac (*Annales de Chimie et de Physique*, t. lxiii) recurs to this theory of the ice at the bottom of the water. He regards with doubt the first explanation of Arago, and adheres rather to the hypothesis of the floating filaments of which Arago speaks in the last place : "The spongy ice," he says, "which is observed on the bed of certain rivers of rapid current has its origin in the small and innumerable flakes of ice which drift on top of such rivers in very cold weather, and whose surface in contact with the air is somewhat below zero. The submersion of these flakes takes place by means of the current which sweeps them along in its movements. Their adhesion, whether to the extraneous bodies which cover the bed of the river or to one another, is occasioned by the congelation of the film of water at the points of contact, owing to the greater coldness of the flakes, while their permanence at the bottom of the water, without other enlargement than through accumulation of numbers, is explained by the constancy of the temperature at zero, which itself could not exist except by the effect of a current sufficiently rapid."

In 1847 Dr. Plieninger, of Stuttgard, published in the annual report of the Wurtemberg Society of Natural Sciences a note, accompanied by an account of the experiments made on the Danube by M. Lenke, of Ulm. Three troughs of deal plank were immersed in that river, one of which was made of smoothly planed boards, the second of rough unplanned boards, while the third had been rendered still more uneven by hewing. It was found that in the first no ice was formed ; in the second there was a deposition of minute crystals ; and in the third, considerable groups and accumulations of ice. The results of these experiments seem to me unfavorable to the views taken by Gay Lussac ; their explanation will be hereafter adverted to.

The following are the experiments which I made in 1829, and which I have since, at different times, repeated. For this purpose I employed three kettles used for smelting, of about one metre in diameter, which I filled with water. In order to judge of the influence of extraneous bodies, I placed at the bottom of one of these kettles bits of wood and cast iron ; in another a little water had been allowed to congeal ; in the third there was nothing. These extraneous bodies exerted no sensible influence on the congelation. At the moment of commencing the experiment the circumambient air was at -2 degrees ; it became colder during the night ; the water was at 0° , and was immediately covered with films of ice which crossed one another at 30 , 60 , and 120 degrees, forming very soon an entire crust of ice over the surface. The following day I broke this crust, which was from 35 to 40 millimetres in thickness ; I decanted the water from the kettles, and found the bottom and sides lined with a continuous stratum of ice having a thickness of 20 to 25 millimetres. The surface was smooth, offering but here and there slight rugosities ; to these rugosities tufts of crystals of ice were found to have attached themselves.

In January, 1860, I made new experiments. I took three smelting kettles of 550 and 670 millimetres diameter, and a wooden tub of 640 millimetres, and filled them with water from the river, which was at $+2$ degrees; the temperature of the atmosphere was -2 degrees in the daytime; it sunk to -5 degrees in the night. The vessels were placed on supports 200 millimetres in height, with a view to having them surrounded with an equal temperature on all sides. The next day, the four vessels were found to be covered with a layer of ice 120 to 140 millimetres thick. On the sides the kettles were covered with a layer of ice of 20 millimetres, and from 15 to 20 on the bottom; this stratum of ice was smooth, and without rugosities. The wooden tub had a stratum of only some 3 millimetres on the sides, and a few tufts of crystals. On the bottom appeared some isolated films of ice 100 to 110 millimetres in length, 5 to 6 millimetres in breadth, and 1 to 2 millimetres in thickness, furnished on the edges with small projecting points, planted vertically on the larger film, like the teeth of a saw; these teeth or lateral crystals were 5 to 6 millimetres long, with a breadth of 1 to 2 millimetres.

These experiments, repeated on different occasions, at a temperature of from -6 to -7 degrees, always yielded the same result. *After being covered with a stratum of ice on the surface, the vessels were also lined with a stratum of ice on the sides and at the bottom, as might have been foreseen; this ice on the walls of the vessel is of different thickness, according to the conductivity and radiation of the walls.* Thus the wooden tub had a thinner layer of ice on its sides than the smelting kettles, and ordinarily only some needles of ice on its bottom.

I observed that in the kettles these layers of ice were proportionably thicker as the external cold was more intense; that they were always somewhat thicker on the side-walls than on the bottom, and that when once formed these layers, themselves a bad conductor of caloric, operated as isolating walls, and scarcely received any augmentation in point of thickness towards the interior. I have also observed that the surface of the walls, as well as the interior surface of the stratum of ice which covered the liquid, was sometimes striated by minute lines, crossing one another at angles of 30, 60, and 120 degrees. Small pools of water of little depth commonly freeze in films which cross one another under the same angles.

In order to observe well the formation of ice *at the bottom of water* I have taken smelting vessels, which I have placed in a refrigerating mixture of snow and marine salt yielding a cold of -16 degrees. The circumambient air was at $+13$ and $+15$ degrees; the water at 0° . Naturally, under these circumstances, ice was not produced on the surface of the water, but was produced at the bottom of the vessels. The congelation, however, was not always the same; at one time needles would be formed, which might be seen to increase sensibly until the ascensional force produced by their slight specific gravity had overcome the feeble adhesion of their minute base, when they became detached, and rising, floated on the surface; at another time the bottom and the walls were very rapidly covered with a thin stratum of smooth ice, marked with the minute lines already mentioned in speaking of the ice formed on the walls of the kettles, or else with a stratum of spongy ice composed of crystals crossing one another, like the ice at the bottom of rivers.

It results from these experiments, as might have been foreseen, that *whenever a mass of water is cooled below 0° , and the walls which enclose it are also at a temperature of less than 0° , this water will freeze at the bottom as well as at the surface, and that if water usually freezes only at the surface, it is because the bottom of the water and the walls are for the most part at a temperature above zero.*

In effect, the earth, always at a temperature above 0° , loses its caloric only at the surface by radiation or by contact with colder bodies. Not only is the earth, which forms the bottom and the banks of rivers and great reservoirs of water, a very bad conductor of caloric, but the water and ice are still worse con-

ductors. Ice, being specifically lighter than water, always rises and floats on the surface when the ascensional force produced by its less weight has overcome its adhesion to the bottom; it sometimes even draws up with it from the bottom of the water bodies still more ponderous than itself. The maximum density of water not being at 0° , but at $4^{\circ}.44$, causes all great masses of water which are more or less tranquil, and even such as have a continuous but not whirling movement, to maintain, at the bottom, a temperature above zero, even when the water is at zero, or frozen on the surface. In winter, at a temperature of -11 and -15 degrees, the reservoir near the forge of Niederbronn, which is but a metre in depth, is covered with a stratum of ice 25 centimetres thick, and yet the water which flows from it has a temperature of $+3$ degrees.

Owing to this admirable concurrence of circumstances, great masses of water never freeze to the bottom; and even when ice does form at the bottom of water, it eventually becomes detached and floats on the surface. If it were otherwise, all our seas, lakes, and great rivers would be but masses of ice which would never be thoroughly melted. Yet we see also that whenever water becomes cooled to 0° , and finds a bottom also cooled to 0° , it congeals at the bottom as well as at the surface. It is necessary, then, in order that ice may be produced at the bottom of water that the latter should be in motion, so that its inferior strata shall be cooled to 0° ; that this cold water shall descend to the bottom of the stream; that it shall chill the walls, and finally encounter, in the course of the movement, some point of repose where its force of adhesion, its capacity of crystallization, may be exerted.

To explain this apparent contradiction: A foreign body, an obstacle placed in the midst of a current of water, produces there two different effects; on one hand, it changes the direction of the liquid which strikes it, and gives to that liquid a movement of rotation sufficiently strong sometimes to form vortices; on the other hand, the molecules of the liquid which happen to be immediately behind the obstacle pass into a state of repose, and there are points where they become stationary and motionless. The conditions here are suitable for the formation of ice at the bottom of rivers. The whirling movement produced by the obstacles brings the water cooled to 0° to the bottom of the bed of the river, and thus chills the walls. Hence the molecules of water, nearly motionless behind the obstacle, can there exercise their force of adhesion and crystallization. But, in order to produce these effects, there must be cold both intense and of some duration.

The influence exerted by these obstacles is evident in the different experiments which I have related; we recognize it in the slight asperities of the unplanned and the roughened boards of Lenke, in the pebbles of the Rhine as observed by Fargeaud, and the piers of the bridge of the Aar described by Hugi.

With Arago, then, I attribute the formation of ice at the bottom of water principally to the obstacles which occur in the current; but, in my view, these obstacles are not solely resting points for the crystals, but they serve, on the one hand, to augment the movement of rotation, the vortiginous movement by which the water at a temperature of 0° is made to descend to the bottom of the river; and, on the other hand, they create stationary points in the midst of the movement, where the crystallizing force can exert itself.

I have satisfactorily established the influence of these foreign bodies in the canal which supplies the works at Zinsweiler. During the winter of 1829 ice was formed beneath the water wherever there were large stones, roots, or branches of trees which were immersed in the canal. I caused the formation of this ice to cease almost entirely by having those extraneous bodies removed. Hence the propriety of removing, at least during great frosts, and as far as possible, all grates and bars of iron from the neighborhood of canal locks and flood-gates; all bodies, in short, which tend to communicate an eddying motion to the water.

Upon the whole, then, it may be said: I. That water which is exposed to a

temperature below 0° in a vessel or reservoir whose walls may be easily chilled, is always covered first on its surface by a thin stratum of ice, and that afterwards the walls and bottom of the vessel also become covered with a stratum of ice. II. The thickness of this stratum is in direct ratio to the intensity of the cold, and in inverse ratio to the conductivity of the walls; the stratum of ice itself operates as a wall, which is a bad conductor. III. There remains, almost always, at the centre a certain quantity of water which, surrounded on every part by ice, with difficulty loses its latent heat, and does not freeze. Very often, also, a bubble of air, which has been disengaged from the water during its congelation, is comprised in the mass. But it sometimes happens, through intense and continued cold, that the upper ice cracks, and the caloric of the central mass escaping by the fissures, the whole congeals, and the surface assumes a convex and protuberant form, from the expansion of the ice formed at the centre. IV. The splashes or small puddles of water which occur in the roads or fields are promptly covered with a thin crust of ice, which assumes the form of films crossing each other at 30 , 60 , and 120 degrees, and leaving void spaces between them; the water which filled them is absorbed by the porosity and capillarity of the surrounding earth, and, in turn, becomes congealed. V. It is quite otherwise with water in large masses, for water at $4^{\circ}.44$, being specifically heavier than that at 0° , descends to the bottom, while the water of the surface continues to grow colder, and finally is frozen. VI. In order, then, that ice may be formed at the bottom of great masses of water, it is necessary, first, that the water should be impressed with a movement sufficiently rapid to overcome the superposition by strata according to the differences of specific gravity, and to bring to the bottom the cold strata, so that the water may be chilled to 0° quite to the bottom and the inferior walls, growing progressively colder, shall also be brought to 0° ; secondly, that there shall exist in the midst of the current an obstacle against which the water impinges.

In effect, whenever there occurs in a current a body forming an obstacle, the collision with that obstacle augments the movement of rotation of the current, and may even occasion a vortex or eddy in the water; it must be recollected at the same time that behind this obstacle there is a space where the water is in a state of perfect repose—so much so that when the body which forms the obstacle is of considerable volume, a deposit of sand and even pebbles takes place at that point and forms a sort of delta. It is here that the ice of the bottom, the *grundeis*, is formed, the adhesion of which gradually augments the volume of the obstacle and the effect produced, until the moment when, by virtue of its smaller specific gravity, the ice is detached, and is borne to the surface of the water.

At a session of the Society of Natural History of Strasbourg, May 3, 1864, Professor Bertin presented a memoir on the polarization of light by ice, from which it appears that the ice formed at the bottom of water polarizes light in the same manner as the ice formed at the surface.

There is a valuable article on ice, by L. F. Kœmtz, in the *Encyclopædic* of Ersch and Gruber. The specific gravity of ice is there given as follows: According to Kraft, 0.905; Irwin, 0.937; Scoresby, 0.9146, 0.9166, 0.9253; Royer and Dumas, 0.950; Osonn, 0.9268. Thomson, in his *Chemistry*, gives 0.2900, which is nearly the mean of the above numbers.

As regards the form of the crystal of ice, Haüy thought that it might be deduced from the octahedron. Brewster (*Poggendorff's Annalen*, t. vii, 509) recognizes hexahedrons terminated by three planes. Hericart de Thury (*Ann. de Chimie et Physique*, xxi, 156) adopts the hexahedral prism. Clarke, (*Trans. of the Philosophical Society of Cambridge*, 1213,) in a seemingly very exact article, pronounces for rhombohedrons, with angles of 120 and 60 degrees. This is confirmed by Marx and Brewster, (*Ann. de Poggendorff*, xxxii, 399,) and seems corroborated by our own observation of lines crossed at 30 , 60 , and 120 degrees, as already noticed. See also Scoresby: *Cristillisation de la neige*, in the *Ann. de la Chimie et de Physique*, t. xviii.

THE EARTHQUAKE IN EASTERN MEXICO OF THE SECOND OF JANUARY, 1866.

BY DR. CHARLES SARTORIUS, OF MIRADOR, NEAR HUATASCO, DISTRICT OF CORDOVA,
STATE OF VERA CRUZ, MEXICO.

[From a letter addressed to the Smithsonian Institution.]

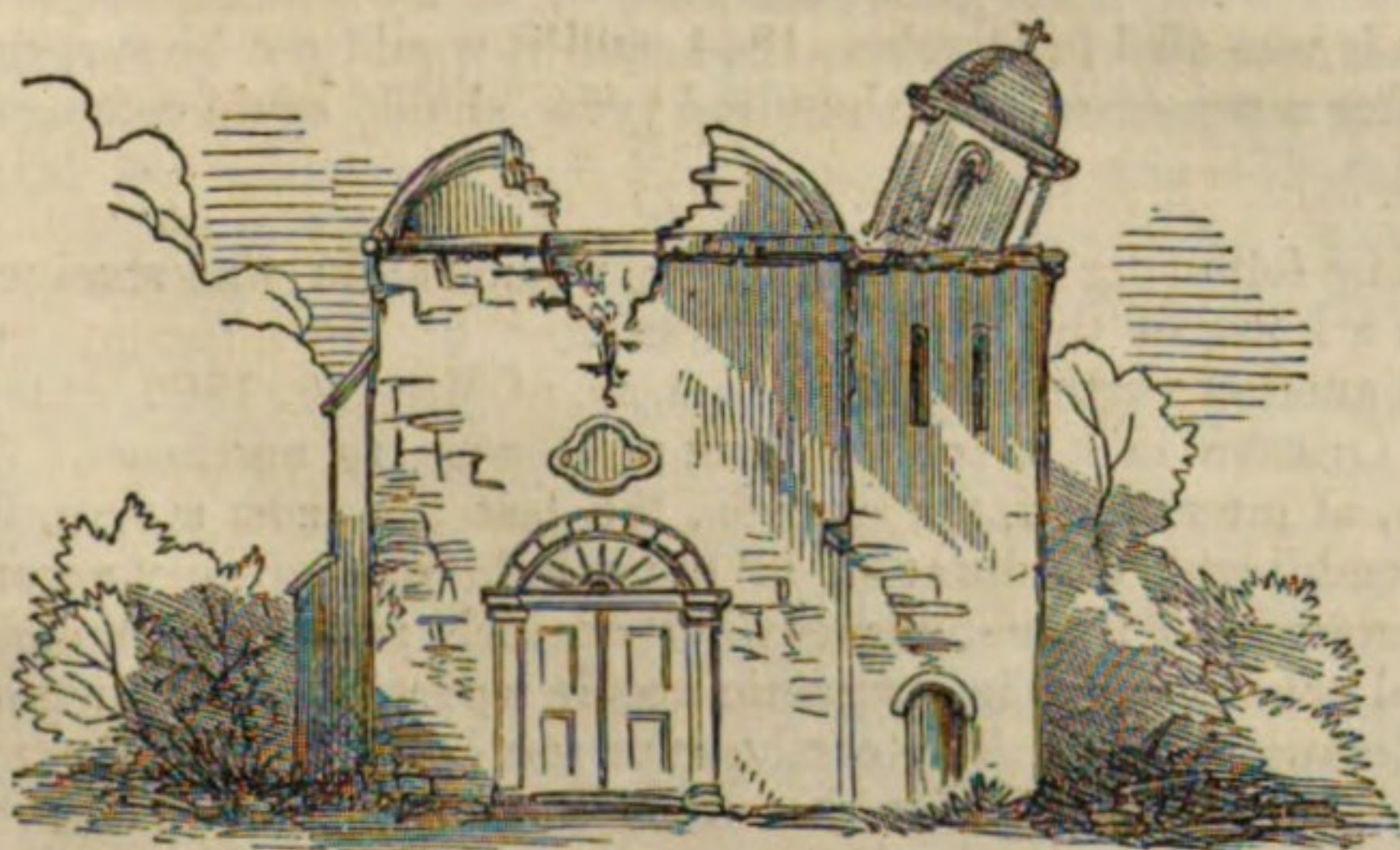
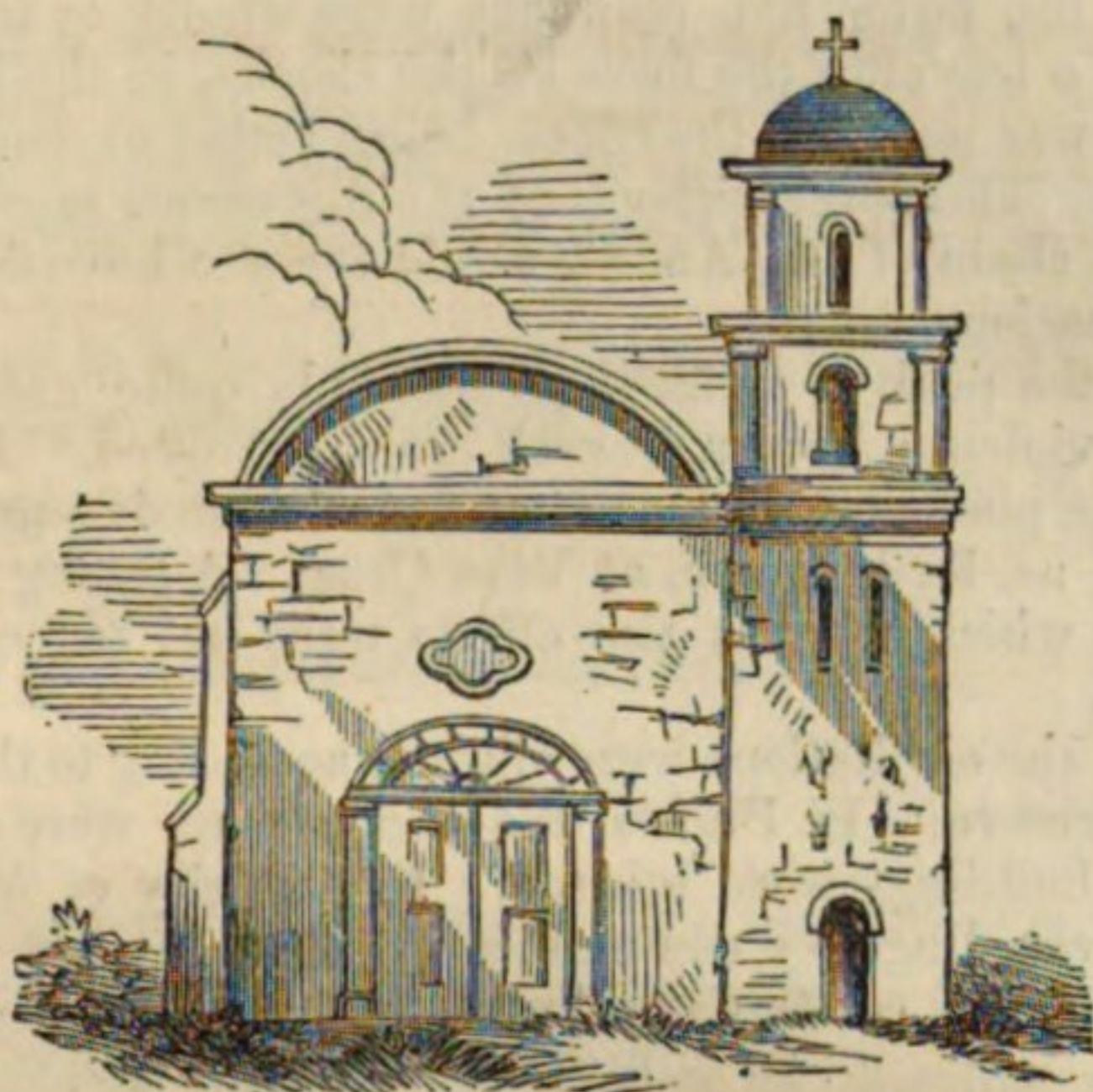
ON the 2d of January, 1866, at six hours ten minutes in the evening, the earth shook without detonations; the movement seemed to be vertical, and lasted some ten seconds; then followed a strong shock from west to east; after eight seconds another equally strong, succeeded by strong oscillations which endured for about twenty seconds, and finally subsided in a tremulous motion. The duration of the whole phenomenon I estimated here at one minute. The beams of houses creaked and were perceptibly moved; doors opened and closed; utensils were thrown down from west to east; mirrors and pictures on the wall shook to and fro; and a pendulum, which I had suspended by a long string, exhibited vibrations of one yard for ten minutes after the whole was over. The column of the barometer sank and rose—the magnetic needle vibrated. These were the phenomena here, but no walls were fractured, and the high chimneys of the steam and sugar factories remained uninjured. The hills consist throughout of conglomerates, which may be observed in ravines to the depth of 500 feet.

Huatasco lies about ten miles (English) south from this place, surrounded by volcanic hills, (trachite and lava,) in a southwardly direction from which project three mountain craters, composed of crystalline limestone. Here the effects were much stronger. In the cathedral a part of the dome fell in; the walls of many houses were ruptured; hundreds of earthen and porcelain vessels were dashed to pieces. In two neighboring villages the churches were destroyed, and large masses of rock were detached in the adjacent limestone mountains and rolled into the valley.

The focus and centre of the whole concussion was the volcano of Orizava, which rises ten miles southwestwardly from Huatasco. At its foot, on the east side, lies the city of Coscomatepec, of 4,000 inhabitants. Here the concussion was so violent that the new and strongly-built parish church, with cupola and trebly vaulted dome, was reduced to ruins; many private houses were rendered uninhabitable; many walls overthrown, but no human life was lost. On the west side of the great mountain, the city of St. Andres Chalchicomula suffered more than any other; several churches and numerous houses were destroyed, and many of the inhabitants buried under the ruins.

The history of the country informs us that the volcano was in activity from 1559 to 1569, but has since been at rest. Yet, although eruptions may have ceased, certain it is that the flame in its depths has not been quenched. This is manifested by the columns of smoke which ascend from time to time, the *fumarolles* on the sides, glowing hot rocks on the western declivity, hot sulphurous springs at the eastern foot, &c. On the morning after the earthquake it was observed that the snow-covered cone (3,000 feet, the absolute height of the mountain being 17,800 feet) was almost bare of snow on the south side, while the southwest border of the crater had fallen and a vertical cleft of the highest peak had taken place. This cleft traversed the entire summit, and from its

deepest part gushed great volumes of water. The length of the cleft is estimated at 1,000 metres; its breadth at one metre. The volcano is surrounded by limestone mountains, and stretches southwardly in a calcareous formation. Wherever limestone forms the chief mass of the chain, the effect of the concussion was greatest. In the village of Chocaman, on the southeast side of the volcano, between high calcareous ranges, under which extends a stratum of clay slate, the violence of the concussion is most conspicuous. The church built in the sixteenth century fell, but of the three stories of which the tower consisted, the middle one was precipitated outward, so that the highest fell upon the lowest, and remained standing.



In the city of Cordova the church of the convent of San Antonio, two hundred years old, sustained the loss of its cupola and the dome of its nave, while the parish church—a handsome building with three vaulted naves—is so injured as to be unfit for divine worship; the large town hall, with its arcades, the hospital, and many private dwellings were likewise so much damaged as to threaten to fall.

Orizava, eight miles west from Cordova, though surrounded by high calcareous ridges, suffered less; the reason of which may be that the town stands on the site of an ancient lake, which, after a bed of from six to eight feet of dam-earth, contains a thick stratum of chalk, and from its porosity propagated the shock with less force; yet damage was not wholly averted. A church once

belonging to the Jesuits was thrown down, as was also the upper part of the high tower of the cathedral. This part had been but newly built, in order to place a clock thereon, when the earthquake of October, 1864, hurled it thirty yards distant towards the market-house; the reconstruction was resumed, and on the day when the clock was placed in position the earthquake again demolished the dome of the tower, but without injury to the clock.

From Orizava a valley stretches to the southwest, bordered by steep rocks, through which passes the highway leading to Mexico. In this valley, which is twelve miles long, the concussions were peculiarly violent. Several churches and many private houses were destroyed, and a number of persons lost their lives. Further to the south the towns of Tehuacan and Oajaca were visited most severely; in the latter five churches were wholly or in part demolished. From the report of a traveller the force of the shocks, in the long distance from Orizava to Oajaca, was peculiar, the effects being rather extended in length than diffused in breadth. The neighborhood of the calcareous mountains, which run parallel to the great chain of the Andes, would seem to have determined the conditions of the concussions.

Northward from the peak of Orizava, it was only quite near that point that the movement was violent; here a church was destroyed. In Jalapa, though very perceptible, the phenomenon was attended with no damage. The same was the case to the east, as, for instance, at Vera Cruz. A strong norther was blowing at the time, on which account the effects were not perceived on board the ships in the harbor.

To the westward the oscillations were slighter according to the greater distance from the peak of Orizava. In Puebla the concussions were strong, but not so much so that large buildings were injured. In the city of Mexico the effects were mitigated. According to a communication from a point seventy-two miles west of the latter city, an earthquake, but of no considerable force, was distinguishable.

All opinions concur in assigning the peak of Orizava as the focus of the phenomenon, as it was also in October, 1864, and it would not be surprising if that mountain, after a repose of three hundred years, should again commence its eruptions.

NOTE.—The following supplementary communication was received from Dr. Sartorius, in a letter of the 27th May, 1866:

“We had another earthquake at 9.15 a. m. of May 10, 1866, extending from the peak of Orizava in a direction from southwest to northeast. There were three shocks, at intervals of ten seconds, the last the most severe, followed by continued tremblings; the duration of the whole was seventy seconds, during which the barometer fell one-hundredth of an inch, returning immediately after to its original condition. The magnetic needle was without declination, but with a strong inclination north. The earthquake was local, only feeble traces having been observed in the city of Mexico. The shock was so severe in Orizava that several houses were destroyed and some persons killed. The oscillations were from north to south; the time the same.

“On the 27th of April a violent shock was noticed southwest of the city of Mexico, proceeding from the volcano of Jorullo, of which no traces were observed here.”

STATISTICS RELATIVE TO NORWEGIAN MOUNTAINS, LAKES, AND THE SNOW-LINE.

DEPARTMENT OF STATE,
Washington, November 22, 1865.

SIR: I transmit herewith, for your information, and the use of the Institution, a collection of tables, maps, &c., showing the height of the Norwegian mountains, with other valuable papers transmitted to this department by the consul of the United States at Bergen as enclosures in his despatch No. 52, dated September 29, ultimo.

I will thank you to advise this department of the receipt of the same.

I am, sir, your obedient servant,

F. W. SEWARD,
Assistant Secretary.

JOSEPH HENRY, Esq.,
Secretary of the Smithsonian Institution.

STATISTICS OF NORWEGIAN MOUNTAINS EXCEEDING THREE THOUSAND FEET IN HEIGHT.

In the geographical publications relative to Norway published in foreign countries, the heights of few of its mountains have been given, and even of those few, the statements with regard to many are erroneous. I have therefore deemed it expedient to compile a table of those Norwegian mountains which exceed in height 3,000 feet above the level of the sea. The measurements in all cases have been reduced to English feet, the Norwegian foot being equal to 1.029357 English; all fractions under half a foot have been stricken out, and all over half counted as one.

The measurements made by theodolite, levelling, or other geometrical methods are specified; all others were obtained by the barometer. I have given all the different measurements and results made by different persons, and it will be observed that many of these measurements, made at different times, differ considerably. Such discrepancies are due to the state of the atmosphere and forbid perfect confidence in the results, but great heights cannot well be measured by levelling or other geometrical methods without involving much time and great expense. It is, however, thought that when measurements are made on different days, the mean result will be nearly correct.

The length and breadth of the larger lakes of Norway stated herein are derived from Mr. Schöth's Geography, in which the dimensions are given in Norwegian miles, all fractions below one-sixteenth of a mile being rejected. The dimensions are reduced to English geographical miles, the proportion adopted being one Norwegian mile to six English geographical miles. There are, in addition to the lakes whose sizes are here given, many smaller, but, as it was only my intention to furnish a correct enumeration of the larger ones, as of the highest mountains, all less than one Norwegian mile in length have been left unnoticed, as being of inferior interest.

I have also given the height of the snow line indicated by different observers, from which it will be seen that the gradual descent of this line toward the

north, as stated by Professor Leopold Von Buch in his travels through Sweden and Norway, cannot be fully relied upon. By comparing the various statements, we must conclude that the height does not only depend upon the latitude, but also to some extent on the longitude as well as physical conditions of the different localities.

As many of the names of the Norwegian mountains allude to their form or other peculiarities, I have deemed it expedient to give, in alphabetical order, explanations of such, derived wholly from Major Vibe's measurements of heights.

I have also enumerated, in alphabetical order, the authors to whom we are indebted for the measurements, with references to the publications in which they have been given.

I am especially indebted to Mr. Carl Stoud Platou, mayor of this city, Mr. J. Geelmûyden, A. M. and rector of the Latin school, both authors of geographical publications, for much valuable information; to Dr. Johan Kohren, director of the public museum of Bergen, for his kindness in facilitating for me the use of the manuscripts and general library of the museum; and to Mr. J. J. Aastrand, director of the observatory of Bergen, for valuable assistance in the arrangement of this compilation.

O. E. DREUTZER.

CONSULATE OF THE U. S. OF AMERICA,
Bergen, September 28, 1865.

Heights of mountains over 3,000 feet above the ocean.

THE AMT OF HEDEMARKEN.

Blekkefjald, Tryssil, in the district of Osterdalen.....	3,602	feet above the sea, measured by Keilhau, in the year 1838.
Bratfjeld, east of Fæmundsjö, (lake,) near the Swedish boundary.....	3,045;	Hörby; 1854.
Drevfjeld, at Tryssil, Osterdalen, point upon the boundary line between Sweden and Norway, mark No. 131..	3,222;	Hertzberg, by theodolite; 1849.
Highest summit of the mountain, mark No. 132.....	3,442;	Hertzberg, by theodolite; 1849.
Eldaahögda, between Elvedalen and Ringebu.....	4,148;	Brock; 1827.
Elgepiggen, at Rendalen, between the river Glommen and Lake Fæmund.....	5,306;	Brock; 1827.
Elgaabaagn, east of Fæmundsjö.....	4,882;	Hörby; 1854.
Faxefjeld, point on the Swedish boundary line, at Tryssil, Osterdal, the southwest horn.....	3,088.	The north horn, upon the Swedish side of the boundary, southeast of the boundary mark No. 126.
	2,918;	Keilhau; 1838.
Flerstöten su Faxefjeld.		
Fulufjeld, at Tryssil, upon boundary line, mark No. 127..	3,225;	theodolite; Hertzberg; 1849.
Do.....do.....	No. 128..	3,340; theodolite; Hertzberg; 1849.
Do.....do.....	No. 129..	3,538; theodolite; Hertzberg; 1849.
Gröttingbratten, west of the river Glommen, in the district of Rendalen.....	3,820;	Brock.
Gröthaagn, east of Lake Fæmund, district of Osterdal..	4,701;	Hörby; 1854.
Herjehagna, point upon the Swedish boundary, in the district of Osterdalen.....	3,881;	Keilhau; 1838.
	3,720;	Hörby; 1854.
	4,069;	theodolite; Hertzberg; 1849.
Humelfjeld, or Graahögda, highest point, district of Osterdalen.....	5,148;	Brock.
	5,093;	Hörby; 1847.
Nehatten, Osterdalen.....	4,323;	amt map.

Salfjeld, or Salsfjeld, east of Lake Fæmund, at the Swedish boundary, Osterdal	4,153; Hisinger; the north horn.
	3,946; Hörby; 1854.
Sörkvola, east of Lake Fæmund, Osterdalen	3,088; Hörby; 1854.
Svukufjeld, on the Swedish boundary, Osterdalen	4,702; Hisinger.
	4,692; amts map.
Svukustöt, east of Lake Fæmund, Osterdalen	4,624; Hörby; 1854.
Sölen, or Solentinden, southwest of Lake Fæmund, Osterdalen	6,176; Kraft.
	5,835; mean of two measurements; Hörby; 1848.
Sölen, (Storsölen,) at the Little Elvedal, Osterdalen	6,176; Brock.
Sölenkletten, lower peak, separated from Storsölen in Osterdalen	4,644; Brock.
Tronfjeld, at Tönset, Osterdalen	5,749; Esmark.
	5,632; Hisinger.
	5,519; Brock.
	5,916; Hörby; 1854.
Tryssilfjeld in about the centre of the parish of Tryssil, Osterdalen	3,738; Keilhau; 1838.
Vonsjogusten, upon the Swedish boundary, in the north of the district of Osterdalen	3,420; Hörby; 1854.
	3,483; theodolite; Hertzberg.

THE AMT OF CHRISTIANS.

Aakerkampen, at Gudbrandsdal, in the district of Quicækne	4,632; Brock; 1827.
Armehornet, at Vang, district of Valdars	4,966; Wergeland; 1843.
Aursjöhøe, at Lom, Gudbrandsdal	4,152; Wergeland; 1841.
Bitihorn, in the north of the district of Valdars	5,324; Keilhau and Brock
Bounaaset, upon Filefjeld, northwest, in the district of Valdars	4,404; Wergeland; 1843.
Bæverhöiden, at Lom, Gudbrandsdal	3,635; Wergeland; 1844.
Brurskardknatten, at Valdars	5,017; Wergeland; 1843.
Digervarde, between Lom and Læssö, Gudbrandsdalen	5,661; Brock; 1827.
Dovre range of mountains:	
Blaahat, (at the snow line)	5,353; Naumann.
Liltvaratind	5,353; Naumann.
Fogstuehie, or Graahøe, about the highest of the mountain back, south of the river Foldal, between Hjärkin and Fogstuen	5,692; Fearnley; 1841.
	5,685; Brock.
Knulshoe, east of Kongsvold	5,456; Brock; 1826.
Sletfjeldet, upon Dovre	5,457; mean height; Naumann
Storekuven, east side of Dovredal	4,885; Brock.
Dryllenaaset, the outer horn between Voldal and Bygdensö, (lake,) district of Valdars	4,868; Wergeland; 1843.
Dyringshøe, at Lom, Gudbrandsdal	4,264; this point is of even height with Opnaaset, and about 205 feet lower than the highest top of the mountain of same name west of Söverhøe; Wergeland; 1841.
Elje Vashøe, the lowest point of the ridge, between the Great and Little Vashøe (Elje Vashøe)	3,649; Fearnley; 1841.
Fagersetnaaset, north of Ionskardsoeter, Valdars	5,475; Wergeland; 1843.
Filefjeld, upon the boundary between the Stifts of Christiania and Bergen:	
Stugunaaset	4,827; Wergeland; 1843.
Sörfjeld, by Nystuen	3,163; Sommerfelt.
Formekampen, at Vaage, in Gudbrandsdal	4,836; Brock.
Fuglhøe, isolated horn between Vee and Grönflyen in the high mountain south of Ottavandet, (lake,) Gudbrandsdal	4,894; Brock.
Fæförkampen, at Sodorp, Gudbrandsdal	3,945; Brock.
Gaakilskardet, in the north of Gudbrandsdal	4,952; Brock; 1827.
Galdebergknausen, foot of, in the district of Valdars	5,059; Brock and Keilhau.

Galden, at Tyrevand, (lake,) in the district of Valders...4,676; Wergeland; 1843.

Galdhøpiggen, great, or Ymesfjeld, the highest mountain
in the north of Europe, at Lom, Gudbrandsdal.....500 feet higher than Glittertinden;
also about 8,544 feet; Wergeland; 1841; 8,338, or 7,850,
about 416 feet below the
summit, measured by theodo-
lite; Hansten and Andersen;
1844; mean of three measure-
ments.

Glellerjhøe, at Lom, Gudbrandsdal6,845; this point is of even height
with Skauthøe, and about
300 feet higher than Laur-
høe, and 21 feet lower than
Rundhøe; Wergeland; 1841.

Glittertinden, at Lom, Gudbrandsdal; part of Iotunf-
jelden8,040; about 50 feet below the high-
est snow horn; Wergeland;
1841.

Graahøe, on the range of mountains between the districts
of Valders and Gudbrandsdal5,134; Brock.

Graahøgda, the highest crag of the group of mountains
called Klövklön, between Vinebygden and Sødorp,
Gudbrandsdal4,837; no mountain situated further
south reaches this height.

Grindadden, in the district of Valders5,605; mean of three measures;
Holmboe; 1829.

Grötaafjeld, at Lom, Gudbrandsdal6,382; in about two miles west of this
is a high tind or horn of even
height with Sundedalspiggen
and Haslbrahøe; Wergeland;
1841.

6,921; Wergeland; 1845.

Grönflyen, by the Otavandet, (lake,) Gudbrandsdal....5,043; Brock.

Grönsendknippen, at Slidre, district of Valders4,370; Brock and Keilhau.

Heggerbothövde, or Heggerbollensæter, at Lom, Gud-
brandsdal.....4,505; Wergeland; 1841.

4,193; Wergeland; 1842.

Heilstuguhøe, (see Nautgardstinden,) in the north of Gud-
brandsdal.....7,677; Brock.

7,537; Wergeland; 1841.

Heindalshøe, north of Hvindalsvand, (lake,) Hvindal,
in the Gudbrandsdal5,970; Brock; 1827.

Höggjöemen, between the rivers Tora and Töisa, at Lom,
Gudbrandsdal.....5,707; Wergeland; 1842.

Höigien, at Roekne, in the Gudbrandsdal3,966; birch timber is found upon
the summit: Brock.

Höitinden, at Gudbrandsdal.....3,933; Brock; 1827.

Itmandshøeden, between Ætnedal and Sæl, Gudbrands-
dal.....5,611; the highest crag is about 100
feet higher.

Jetta, upon the ridge between Otavand (lake) and Dovre.5,433; Brock.

Jukuleggen, or Högeloftseggen, between Valders, Hem-
sedal, and the inner sogn.....6,291; Wergeland; 1845.

Kalvaahigda, or Hugnafjeld, in the district of Valders..7,155; Brock.

7,139; Brock and Keilhau.

Kraakhoved, between Birid and Terpen, Gudbrandsdal.3,203; Suhrlund; 1841.

Kringla, (see Styrfjeld.)

Kroshoe, at Lom, Gudbrandsdal.....5,712; Wergeland, 1842.

Kvammenaaset, at Vang, District of Valders3,901; Wergeland; 1843.

Kvitingskjolen, at Lom, Gudbrandsdal6,333; Wergeland; 1841.

6,587; Brock; 1827.

Kvilljernklubben, at Vang. Valders5,170; Wergeland; 1843.

Lerhøe, at Lom, Gudbrandsdal, (see Nautgardstenden)..7,617; Wergeland; 1841; mean of
several measurements.

7,677; Brock.

7,537; Wergeland; 1841.

Lomseggen, at Lom, Gudbrandsdal; the northeast peak	4,982; Naumann.
	5,087; Wergeland; 1841.
The peak further to the westward	5,977; Naumann.
The southwestern peak	6,653; Naumann.
	6,926; mean of several measures; Wergeland; 1841.
	6,653; Brock; 1827.
Lomshorungen, at Lom, Gudbrandsdal	5,661; Brock; 1827.
	6,654; Wergeland; 1842; the latter is considered too large.
Mosebakkfjeld, at Lom, Gudbrandsdal	3,596; Wergeland; 1841.
Muen, or Muven, at Ringeby, Gudbrandsdal	4,756; the last mountain south of Rundane and Sölenklellen, being cone-formed; Brock.
Mugnafjeld, (see Kalvaahögda.)	
Mukampen, between Hedalen and Krikne, in Gud- brandsdal	5,898; Broch.
Nautgardstinden, in the north of Gudbrandsdal	7,677; Broch.
	7,537; Wergeland; 1841.
Norekampen, between Fröen and Ringeby, Gudbrands- dal	3,620; Broch; 1827.
Nysoterkampen at Ringeby, Gudbrandsdal	3,602; Broch; 1827.
Pighætten, upon Dovre, the last horn upon the, from northwest towards Hjärkin, stretching mountain back	5,105; Brock.
Pekhætta, according to Professor Naumann, a high point south of Vaataasö, (lake,) upon Dovre	4,632; Naumann.
Præstkampen, in the north of Gausdal, Gudbrandsdal	4,094; Broch; 1827.
Rundane, also called Runderne, the western horn of a collection of alps, between Ætnedal and Sæl, Gud- brandsdal	6,392; Broch.
The north horn, Högrund	6,691, and over. The Lake Rond (Rondsöen) divides Rondene or Rundkumpene into two separate groups of moun- tains.
The three southern horns	6,928; Broch.
The furthest off horn, Degerrund	6,270; Fearnley; 1841.
Rulen at Gausdal, Gudbrandsdal	4,998; Keilhau; 1843.
	4,936; Brock; 1827.
Sigurdshöpiggen, at Vaage, Gudbrandsdal	5,661; Broch; 1827.
Skaget, between the districts of Gudbrandsdal and Val- ders	5,548; Broch.
Skarhöe, on the boundary between Vaage and Lom, Gudbrandsdal	5,355; Broch; 1827.
Skalstenden, or Skardstinden, upon the boundary be- tween Læssö and Lom, Gudbrandsdal	6,176; Broch; 1827.
Skarvdalseggen, at Lom, Gudbrandsdal	6,315; Wergeland; 1841.
	6,326; Wergeland; 1842.
	6,485; Broch; 1827.
Skotten, at Vang, district of Valdres	5,073; Wergeland; 1843.
Stagsfjeld, at Ringeby, Gudbrandsdal	3,960; Broch; 1827.
Sletflykampen, at Lom, Gudbrandsdal	4,514; Wergeland; 1841.
Snehetten, or Snehætten, upon Dovre, Gudbrandsdal	8,120; Esmark.
	7,509; Skreahög is of about the same height; Naumann.
	7,566; Hisinger.
	7,662; Everest.
	7,588; Shultz.
Stebersberget, between Fröen and Rengeby, Gudbrands- dal	3,602; Broch; 1827.
Steenflybræpiggen, at Lom. (See Nautgardstinden.)	
Storhögda, at Læssö, Gudbrandsdal	6,691; Broch.
Storhöpiggen, at Læssö, Gudbrandsdal	4,726; Broch.
Stugunaaset. (See Filefjeld.)	
Stygfjeld, upon the boundary of Osterdal and Gud- brandsdal: the western horn	5,892; Fearnley; 1841.
The eastern horn	6,176; Fearnley; 1841.
The lowest of the mountain back, stretching from Stygfjeld to the Great Kringla, being the dividing ridge between the rivers Gremsaa and Deraaen, in Gudbrandsdal	3,435; Fearnley; 1841.

Svartdalspiggen, at Lom, Gudbrandsdal.....	7,128 ;	this horn is about fifty feet lower than the one in the east from this rising horn of the same name; Wergeland; 1841. (See Nautgardstinden.)
Srartkampen, at Sæl, Gudbrandsdal.....	4,518 ;	Brock; 1827.
Synstakerken, at Lom, Gudbrandsdal.....	4,364 ;	Wergeland; 1842.
Sörfjeld. (See Filefjeld.)		
Tjernhuttinden, at the north of Gudbrandsdal	7,823 ;	Wergeland; 1841.
	7,679 ;	Wergeland; 1843.
Troldhovd, at Vang, in the district of Valdres	3,208 ;	Wergeland; 1843.
Tværaadalskerken, or Stændalskirken, in about the centre of the snow plain between Lom, in Gudbrandsdal, and Sogn, in amt of North Bergenhus.....	6,886 ;	Wergeland; 1842.
Tværffjeld, at Lom, in the district of Gudbrandsdal....	6,136 ;	Wergeland; 1841.
Tykningsuen, at Lom, Gudbrandsdal	7,772 ;	Wergeland; 1841.
Veslefjeldtinden, the outer horn, between Lurdal and Bævervand, (lake,) Gudsbrandsdal.....	6,912 ;	Brock.
	7,224 ;	mean of two measures; Wergeland; 1841.
Vulueggen, at Lom, Gudbrandsdal, highest horn.....	5,672 ;	about 300 feet higher than the highest Veslefjeld in Otadalen.
Ymesfjeld. (See Guldhöpiggen.)		

THE AMT OF BUSKERUD.

Augendshoug, at Krydsherred, west of Noufjeld.....	3,990 ;	Wergeland; 1840.
Björdalsnuten, at Skurdal, in the district of Numedal ..	4,527 ;	Bassöe; 1846.
Bolhövd, at Aal, district of Hallingdal.....	3,960 ;	Wergeland; 1845.
Brakanuten, upon the boundary between Numedal and Telemarken, and near the boundary of Hardanger...	4,454 ;	Bassöe; 1846.
	4,863 ;	Næser; 1852.
Dyna, the highest point of the range of mountains between Næs and Aal, at Hallingdal	4,359 ;	Wergeland; 1845.
Eidsfjeld, at Rollag, highest peak.....	4,387 ;	Wergeland; 1845.
	4,506 ;	Næser; 1846.
	4,351 ;	Bassöe; 1846.
Next highest peak	4,347 ;	Naumann.
Tjeldsenden, the eastern horn upon the mountain, backs north of the great (store) Strandefjord, at Aal, in the district of Hallingdal.....	5,935 ;	Wergeland; 1845.
Hagelbunatten, the southern and highest top of the Renfjelds, at Sigdal.....	4,219 ;	Wergeland; 1842.
	4,148 ;	Wergeland; 1845.
Haldalshögda, south of Haldal, on boundary between Hallingdal, Borgund, and Umland	5,740 ;	Wergeland; 1845.
Hallandsfjeld, in the north of Numedal	3,835 ;	Wergeland; 1845.
Hallingnallen, horn upon Rensjofjeld at Næs, district of Hallingdal.....	4,391 ;	Wergeland; 1842.
	4,303 ;	Wergeland; 1845.
Hallingskarven, between the districts of Hallingdal and Hardanger.....	6,073 ;	Keilhau; 1849.
Folaskardskarven, horn upon Hallingskarven, at Hallingdal, near the boundary line of the stift of Bergen...	6,432 ;	Wergeland; 1845.
Præstholtskarven, high horn upon Hallingskarven....	6,331 ;	Vibe.
Halnekollen, between Numedal and Hardanger.....	4,539 ;	Bassöe; 1846.
Hestejuvnatten, at Næs, Hallingdal	3,494 ;	Wergeland; 1840.
Högvardeu, the highest mountain top between Eggedal, in Sigdal, and Flaa, in Næs, about three miles east of the church of Hovland, (Eggedal).....	4,793 ;	Wergeland; 1845.
Jorunfjeid, west of the Tunhovdfjord, Numedal	4,237 ;	Wergeland; 1842.
		4,406 ; mean of two measures upon different days; Wergeland; 1845.
Jukuleggen, or Högeloftseggen, between Hamsedal and Valdres, at Tndre Sogn	6,281 ;	Wergeland; 1845.
Jöranfisen, west of Sperilensjö, (lake).....	3,443 ;	Keilhau; 1838.
Korpenatten, upon Renfjeld, Hallingdal	4,453 ;	Wergeland; 1843.

Krækjehua, between Numedal, Hallingdal, and Hardanger	4,357 ; Bassøe ; 1846.
Langaasen, two miles east of Rollaûg, (church,) district of Numedal	3,013 ; mean of two measures ; Næser ; 1846.
Norifjeld, at Rollaûg, Numedal	4,941 ; Keilhau ; 1838.
	4,962 ; Wergeland ; 1842.
Nybunaaset, at Aal, Hallingdal	5,631 ; Wergeland ; 1845.
Oddenakken, at Aal, Hallingdal	4,012 ; Wergeland ; 1845.
Præslholtskarven, horn upon Hallingskarven, east of Buckehalliden	6,331 ; see Præslholtskarven, under Hallingskarven.
Rauebergskarven, at Aal, in the district of Hallingdal ..	5,945 ; Wergeland ; 1845.
Rauhellernuten, upon the mountain plateau of Hardanger, in western Numedal	4,696 ; Bassøe ; 1846.
Reinsfjeld, at Aal, Hallingdal	5,872 ; Wergeland ; 1845.
Röislandsfjeld, at Rollaûg, Numedal	4,263 ; Wergeland ; 1845.
Saabölsfjeld, at Flaa, Hallingdal	4,211 ; Wergeland ; 1842.
Saatenatten, upon the boundary between Numedal and Næs, Hallingdal	3,737 ; Wergeland ; 1845.
Sangerfjeld, at Aal, Hallingdal	3,813 ; Wergeland ; 1842.
	3,940 ; Wergeland ; 1845.
Sigvidnuten, at Opdal, Numedal	4,098 ; Bassøe ; 1846.
Skarseggen, Opdal, Rollaûg, Numedal	4,336 ; Bassøe ; 1846.
Skaupsjönuten, between Numedal and Hardanger	4,665 ; Bassøe ; 1846.
Skogshorn, at Hemsedal, Hallingdal	5,661 ; and 2,500 above the base ; Keilhau.
Skræken, upon the mountain plateau of Hardanger, west at Opdal, Rollaûg, Numedal	4,697 ; Bassøe ; 1846.
Slaabefjeld, about one mile west of the church of Rollaûg, Numedal	3,460 ; Wergeland ; 1845.
Synhovde, at Rollaûg, in the district of Numedal	3,461 ; Næser ; 1846.
	3,719 ; Naumann.
	3,893 ; Næser ; 1846.
Synhovd, at Opdal, Rollaûg, Numedal, about twenty miles northwest of the aforementioned Synhovde, with which it should not be exchanged	4,651 ; Bassøe ; 1846.
Syningen, horn, about four miles northwest of Terpe, Hallingdal	3,478 ; Keilhau & Suhrland ; 1842.
Söllandsfjeld, on the west side of Eggedal	3,475 ; Wergeland ; 1842.
Tjonaasnaasen, or Tjærnaasnaasen, at Rollaûg, Numedal ..	3,813 ; mean of two measures upon different days ; Bassøe ; 1846.
Tunhovdaas, at Rollaûg, Numedal	3,449 ; Wergeland ; 1845.
Usletind, at Aal, Hallingdal	4,633 ; Bassøe ; 1846.

THE AMTS OF JARLSBERG AND LAURVIG.

There are no mountains in these amts over 3,000 feet.

THE AMT OF BRATSBERG.

Aardalssaata, at Hviteseid, district of Ovre (upper) Thelemarken	3,695 ; Bassøe ; 1847.
Baasnuten, at Aamotsdal, Thelemarken	4,747 ; mean of two measures upon different days ; Bassøe ; 1846.
	4,732 ; Bassøe ; 1847.
Blaanuten, the highest summit of Haakenæs-fjeld, at Tind, Telemark	3,997 ; Haakenfjeld is the base of Gausta ; Smith.
Blefjeld, upon the boundary between the districts of Numedal and the Thelemarken	4,364 ; Maochmann.
West Blefjeld	4,463 ; Næser ; 1846.
East Blefjeld	3,919 ; Næser ; 1846.
Bosnuten, by the lake Mjosero in the Thelemarken	4,691 ; Næser ; 1853.
Brakanuten, between Numedal and the Thelemarken, near the line of Hardanger	4,463 ; Bassøe ; 1846.
	4,863 ; Næser ; 1852.
Brokefjeld, at Hviteseid, in the Thelemarken	3,488 ; Suhrland and Ellesen.
	3,599 ; Næser ; 1847.

Djupsjöhövde, at Tind, in the Thelemarken.....	4,893; Bassøe; 1847.
	4,854; Næser; 1853.
Eirfjeld, at Höidalsmo, Laurdal, Thelemarken.....	3,398; Bassøe; 1847.
Eistenfjeld, at Tyresdal, Moland, in the Thelemarken.....	3,912; Bassøe; 1847.
Erthammer, in the south of Hjertdal, Thelemarken.....	3,533; Bassøe; 1847.
Fliseggen, at Vinje, in the Thelemarken.....	5,341; Bassøe; 1847.
	5,312; Næser; 1853.
Gluggvarde, at Nissedal, in the Thelemarken.....	3,035; Næser; 1847.
Glugsvardeggen, west of Vinje, in the Thelemark, near the boundary of the stift of Bergen.....	4,311; Bassøe; 1847.
Grasnuten, at the upper Thelemark, near the boundary of the stift of Bergen.....	4,961; Bassøe; 1847.
Goustaufjeld, in the district of Thelemark.....	6,268; Esmark.
	6,259; Schouw and Smith.
	6,182; Smith.
	6,134; Mashmann.
	6,169; Holmbøe; 1829.
	6,159; Bassøe; 1846.
	6,231; Næser; 1853.
Heggefjeld, west of Nesservandet, (lake,) at Hviteseid, Thelemarken.....	3,454; Næser; 1847.
Hellekionnuten, at the east of Tind, Thelemark.....	4,007; Næser; 1846.
Himingen, at Hjærtdal, in the Thelemark.....	3,444; Bassøe; 1847.
Hætte, upon the mountain plateau of Hardanger, at Tind, Thelemark, 12 miles north of Mjösolvandet (lake)....	4,653; Bassøe; 1846.
Juvigfjeld, upon the east side of the north of Lake Mjösen, Tind, Thelemarken.....	5,017; Smith.
	4,951; Bassøe; 1846.
	5,176; (this latter point of the moun- tain is not the one measured by Bassøe;) Næser; 1853.
Kjelsnuten, or Kilsnuten, at Vinje, Thelemark.....	4,308; Bassøe; 1847.
Kollingerne, south of Hviteseid, upon the boundary be- tween Vraadal and Torrisdal, Thelemarken.....	3,111; Næser; 1847.
Krekledyrflottet, upon Haukelidsfjeldet, at Vang, Thele- marken.....	3,657; Holmbøe; 1829.
Kvamsfjeld, at Tind, in the district of Thelemarken....	4,789; Smith.
Maarsnaas, at Tind, Thelemarken.....	4,853; Bassøe; 1846.
	4,666; Bassøe; 1847.
Medlfjeld store, (great,) at Vinje, in the district of Thelemarken.....	4,684; Bassøe; 1847.
Mælfjeld, or Melfjeld, at Siljord, Thelemarken.....	4,696; mean of two measures made upon different days; Bassøe; 1847.
	4,672; Næser; 1853.
Oklednuten, at Tind, on the Thelemarken.....	4,195; the highest point north of the extent of mountains between the Thelemarken and Rems- dal; Næser; 1846.
	4,099; Næser; 1853.
Præstetinden, at Tind, Thelemarken.....	4,153; Bassøe; 1846.
Raulandsfjeld, west of Lake Mjösen, at Vinje, Thele- marken.....	5,157; Bassøe; 1847.
	5,098; Næser; 1853.
Rautefjeld, at Mo, on the Thelemarken.....	4,487; Bassøe; 1847.
Robottsfjeld, upon the boundary between Vraadal and Hviteseid, Thelemarken.....	3,348; Næser; 1847.
Rusfjeld, upon the boundary between Nissedal and Mo- land, Thelemarken.....	3,345; Næser; 1847.
	3,117; Bassøe; 1848.
Ræksjöhovde, at Tind, Thelemarken.....	4,977; Bassøe; 1847.
Selsnuten, between Vinje, on the Thelemarken, and Suledal, Ryfylke.....	4,572; Bassøe; 1847.
	4,551; Næser; 1853.
Skarfjeld, at Tind, Thelemarken.....	4,923; Bassøe; 1846.
Skorvefjeld, at Siljord, Thelemarken, in northwest from the church.....	3,942; above the Paronaye at Siljord, Carpelan.
	4,448; Bassøe; 1847.
Storefjeld, in the western part of the Thelemarken....	4,887; Bassøe; 1847.

Tangefjeld, at Vinje, in the Thelemarken.....	4,677; Mashmann; 1832.
Tesungtind, in the north of Tind, Thelemarken.....	4,636; mean of two measures upon different days; Bassöe; 1846.
Tindenfjeld, at Tind, in the Thelemarken.....	3,842; Smith; 1812.
Tjønnefjeld, north of Tyrisvand, (lake,) at Moland, Thelemarken	3,399; Bassöe; 1847.
Urdnaasfjeld, upon the boundary between the parishes of Mo and the annex of Skaffe, Thelemarken.....	4,865; Bassöe; 1847.
Vasdalseggen, between Vinje, in the Thelemarken, and Suledal, in Ryfylke.....	5,433; Næser; 1853.
Vatndalsnuten, between Tind and Vinje, Thelemarken..	4,932; Mashmann; 1832.
Vehuskjæringa, at Laurdal, Thelemarken	4,508; Bassöe; 1847.
Venaasfjeld, at the south end of Tindsö, (lake,) Hjert- dal, Thelemarken.....	3,480; mean height of two measures; Næser; 1846.
Vindeggen, in the west of Hjertdal, in the west of The- lemarken	4,895; Bassöe; 1846. 4,927; Bassöe; 1847.
Ævaberg, in the north of Tind, Thelemarken.....	4,629; Bassöe; 1846.

THE AMTS OF NEDENÆS AND ROBYGDELAGET.

Aureskorefjeld, at Bykle, in Valle, amt of Robygd- laget.....	4,240; Falkenberg; 1852.
Gruvletind, at Hyllestad Valle.....	3,767; Næser; 1849.
Holmevasnulen upon Hekfjeld, between the amts of Lister and Mandal and Robygdlandet.....	3,277; Bassöe; 1850.
Kislefjeld, at Hyllestad, Valle Robygdlandet.....	3,393; Næser; 1849.
Kjondalsnuten, upon Hekfjeld, Robygdlandet	3,531; Bassöe; 1850.
Ljomsnet, at Valle, Robygdlandet.....	4,155; mean of two measurements; Næser; 1849.
Rusfjeldhei, at Opslat, Bygland, Robygdlandet.....	3,510; mean of two measurements; Næser; 1849.
Strandefjeld, at Bykle, Valle Robygdlandet.....	4,599; Næser; 1849.
Svarvarnet, Valle Robygdlandet.....	4,499; Næser; 1849.
Urcedalsknuden, at Valle, Robygdlandet.....	4,636; Keilhau; 1839. 4,739; Falkenberg; 1832.
Vatndalsfjeld, at Bykle, Nalle, Robygdlandet.....	3,739; Naumann.

THE AMTS OF LISTER AND MANDAL.

Bergcheia, at Siredal, amt of Lister and Mandal.....	3,496; Bassöe; 1850.
Grubbaafjeld, at Lister.....	3,602; Keilhau; 1839.
Hilleknuden, at Lunde, Tonstad, Lister.....	3,957; mean of two measures by Falkenberg; 1852.
Holmevasnulen, upon Hekfjeld, between the amts of Robygdlandet and Lister and Mandal.....	3,274; Bassöe; 1850.
Silfarrinden, upon Hekfjeld, at Lister.....	3,226; Bassöe; 1850.
Skaaret, upon Hekfjeld, Lister.....	3,385; Bassöe; 1850.

THE AMT OF STAVANGER.

Brandeknuden, at Aardal, in the district of Ryfylke...	3,774; Falkenberg; 1853.
Bakkedalsskardet, at Lunde annex, Ryfylke.....	3,359; Falkenberg; 1852.
Faalasprangknuden, at Höle, Ryfylke.....	4,028; Falkenberg; 1852.
Grodalsheia, at Höle, Ryfylke.....	3,719; Falkenberg; 1852.
Hustveitsaata, at Suledal, Ryfylke....	3,941; Falkenberg; 1853.
Lysekammen, at Höle, Ryfylke.....	4,344; Falkenberg; 1852.
Napenfjeld, at Suledal, Ryfylke.....	4,427; Falkenberg; 1853.
Skaapknuden, at Höle, in the district of Ryfylke.....	3,185; Falkenberg; 1852. 3,153; Falkenberg; 1852.
Natlandsnuden, at Suledal, Ryfylke	3,138; Falkenberg; 1853.
Skaulen, at Suledal, Ryfylke.....	5,172; Næser; 1853.
Snenuten, at Suledal, Ryfylke.....	5,266; Næser; 1853.
Vasdalseggen, between Suledal and Vinje, Ryfylke....	5,433; Næser; 1853.
Venjokula, at Birkreno, Yøderen.....	3,028; Falkenberg; 1852.
Vingenuten, at Suledal, Ryfylke.....	3,587; Næser; 1853.

THE AMT OF SOUTH BERGENHUS.

Fjeldsjöberg, at Graven, in the district of Hardanger, one mile south of the boundary of the stift of Bergen.....	4,756; Bassöe; 1846.
Folgefonden, snow-covered mountain at Hardanger:	
Njuen, upon the northeast corner.....	4,933; theodolite; Sexe; 1859.
	5,034; Sexe; 1859.
The lower edge of the snow upon Valaberg, (glacier,) half mile southwest of Njuen.....	3,628; Sexe; 1859.
Buersdal, the lower edge of the glacier, (Isbræ)....	3,656; Sexe; by theodolite; 1859.
The lower edge of the snowbræ at Odde.....	3,536; Sexe; 1859.
Blaavand, (lake,) at the lowest edge of the glacier..	3,391; Sexe; 1850.
The lowest edge of the glacier six miles west of the estate of Brække, at Odde.....	3,542; Sexe; 1859.
Kjarengbotten, six miles from the estate Ekemo, at Aakrefjord, the lower edge of the glacier.....	2,669; Sexe; 1859.
Upon the summit of the snowbra, three miles southwest from Melderskin.....	4,386; Sexe; 1859.
Urabotten, the lower edge of the snowbra east of Ore, at Mauranger.....	3,400; Sexe; 1859.
The lower edge of the snowbra northeast of Ore, Mauranger, at the northwest corner of Folgefond, at a lake called Iuklavandet.....	3,261; Sexe; 1859.
The mountain plateau under the north edge of the Folgefond.....	4,567; Falkenberg; 1855.
The greatest height of Folgefond, Hundsöere.....	5,456; Hertzberg.
	5,322; Smith.
	5,322; Næser; 1852.
Regnenuten, which, according to the observations of Professor Naumann, is the highest summit of Folgefond.....	5,396; Naumann.
	5,343; Smith.
Thorsnuten, upon the north of the Folgefond.....	5,250; mean of two measures; Næser; 1852.
	5,169; mean of two measures; Næser; 1852.
	4,941; Sexe; 1859.
Upper plateau above Tokheim, six miles from Söræfjord.....	5,456; Hertzberg.
Saxaklep, one of the highest points north upon Folgefond.....	4,632; Naumann.
Solnuten, opposite Ullensvang.....	4,786; Hertzberg.
	4,834; Sexe; by levelling.
The highest point of the highway between Rusæter and Iondal, close by Saxaklep.....	4,519; Naumann.
Gjonekvittingen, (Smith,) Gronekvitingin, (Sommerfeldt,) (Ionakvitingen,) between Haalandsdal and Strandebarm, in the district of Hardanger.....	3,899; Smith.
	3,843; by Kraft.
Gulfjøeld, at Samnanger, in the district of Søndhordland.....	3,239; mean of three measures; Næser; 1852.
	3,088; Naumann.
Haafjeld, at Elm, Søndhordland.....	3,159; Falkenberg; 1853.
Hallincejökelen, the highest mountain in Hardanger...	5,713; at a point upon Hallingjökelen, 206 feet below the highest summit.
	5,352; Suhrland; 1842.
Hallinskarven, between Hallingdal and Hardanger....	6,073; Keilhau; 1849. This mountain does not appear to be much over 5,000 feet, but is one of the highest points between Hallingdal and Hardanger. Naumann, Smith, Forsell, Olsen, and Heissinger, are all giving precise heights, but in their time this mountain was not yet measured. (Vibe.)

Tolaskardskarven, the most easterly and highest horn of Hallingskarven, about the middle of this mountain, at Aal, in the district of Hallingdal . . . 6,431.

In the immediate vicinity of Tolaskardskarven are several yet higher horns, but those are within the boundaries of the stift of Bergen; those are Iökulen, which is calculated to be 6,536; Vosseskavlen, 6,742; Införebreen and Blaaskavlen, east of Urland and north of Vosseskavlen, 6,176; Wergeland; 1845.

Præstholtskarven, horn upon Hallingskarven . . . 6,330.

Further to the south are several higher mountain backs, of about 100 feet higher than this.

Halnekollen, between Hardanger and Numedal . . . 4,539; Bassöe; 1846.

Hardangerfjeld, dividing ridge of the east and west mountains, or mountain division:

Haarteigen, at Kinservig, Hardanger . . . 5,567; Smith and Hertzberg.
5,549; Keilhau and Suhrlund; 1842.
5,540; Næser; 1852.

Hondalsnuten, at Vang, in the district of Voss . . . 4,782; Falkenberg; 1856.

Hundsöira, see Folgefond.

Högeheia, at Eldfjord Hardanger, near the line dividing the districts of Hardanger, Numedal, and upper (övre)

Thelemarken . . . 4,672; Bassöe; 1846.

Ildebrudfjeld, at Vangen, in the district of Voss . . . 3,633; Falkenberg; 1856.

Ildhusfjeld, at Hosanger, in the district of Nordhordland . 3,923; Falkenberg; 1856.

Införebreen, see Hallingskarven.

Iengledsnulen, at Eldfjord, Hardanger . . . 4,541; Bassöe; 1846.

Iökelen, see Hallingskarven.

Kallenuten, upon the boundary between the districts of

Voss and Hardanger . . . 4,471; Næser; 1852.

Kvetenaase, at Vangen, Voss . . . 4,751; Falkenberg; 1856.

Kvetingen, at Strandebrarm, in Hardanger . . . 4,250; mean of two measures; Næser; 1852.

4,123; Falkenberg; 1856.

Lörhæörje, at Vangen, Voss . . . 5,135; Falkenberg; 1856.

Melderskin, see Folgefond.

Nupseggen, at Röldal, Hardanger . . . 5,753; mean of three measures; Næser; 1852.

5,667; Næser; 1853.

Præstholtskarven, see Hallingskarven.

Raveldseggen, at Ullensvang, Hardanger, near the church . . . 4,497;

Von Buch. This range of mountain rises some hundreds of feet higher, but is of about even height for thirty-five or forty miles in distance.

Skupsjonuten, near Eidsfjord, Hardanger . . . 4,665; Bassöe; 1846.

Solbjorgnuten, at Standebarm, Hardanger . . . 4,290; Falkenberg; 1856.

Steinbuhein, at Eidsfjord, Giaven, Hardanger . . . 4,319; Wergeland; 1845.

4,602; Bassöe; 1846.

Storrust, upon the boundary between Voss and Vigör,

Hardanger . . . 3,977; Næser; 1852.

Salhefonden, at Ullensvang, snow-covered mountain,

Hardanger . . . 4,778; Smith.

4,729; Topographical and Statistical Collections, page 30; notes of Forsell 4,850 Swedish feet, but it is observed by Major Vibe that he adopted the measurement made by Smith, without himself having measured it.

Trondevardnuten, at Eidsfjord, in the district of Hardanger . . . 4,644; Bassöe; 1846.

Vasfjæren, at Ulvig, Hardanger	5,353; Næser; 1852.
	5,361; Falkenberg; 1856.
Vesholda, at Strandebarm, in the district of Søndhord- land	3,520; Falkenberg; 1865.

THE AMT OF NORTH BERGENHUS.

Dyrhougen, east of Skagastölen, at Fortûn, in the dis- trict of Sogn	4,009; mean of three measures; Holmboe; 1829.
Dyrhougstinden, near Skagastölstinderm, Sogn	6,538; Bohr.
Haldalshögda, upon the south side of Hildal, between Borgund, Urland, and Hallingdal	5,749; Wergeland; 1845.
Iökuleggen, the highest point, also called Högeloftseggen, between Hemsedal and Valdres	6,291; Wergeland; 1845.
Kamphammerne, at Lom, in the district of Gudbrandsdal	4,272; Langberg.
Køldetind, at Koldedal, in the district of Inner Sogn	7,247; Bouk and Keilhau.
Kvanshift, (store,) north of Dalsfjord, at Søndfjord	3,705; Naumann.
Lodalskaupe, at Nordfjord:	
The south horn, probably the Little Lodalskaupe	6,292; Bohr.
The eastern or highest horn	6,596; (namely, 304 feet higher than the south horn;) by levelling; Bohr.
The base of the store Lodalskaupe	3,993; Naumann.
Snekuppe, between the two Lodalskaupes	6,496; Naumann.
Ringstinderne, at Aurdal, in the Inner Sogn, two horns of the same height	6,176; Holmboe.
Skagastølslinderne, several mountain horns in the inner Sogn:	
See Nautgardstinden	7,566; Keilhau and Boeck. 7,185; Naumann. 7,180; (by geometrical methods;) Bohr.
The northern horn	7,180; by levelling; Bohr.
The horn furthest to the west, which is probably the same as above, is called the north	7,170; Holmboe.
The middle horn	7,678; Holmboe.
The eastern, (Horungen)	8,086; Holmboe.
Sulutind, upon Filefjeld, at Serdal, Inner Sogn	5,887; Von Buch. 5,729; Naumann
Sundalshammaren, between the east and west, running mountain stream, upon Langefjeld, between Sundal, at Opstryn, Norfjord, and Randal Lom	4,137; Naumann.
Surnesælnaasen, at Krogen, in the Inner Sogn	4,028; Ravenaasen and Melkekol- len, on the opposite side of the fjord, of about the same height; Holmboe.
Tværaadalskirken, or Slændalskirken, in the centre of the snow-plain, between Lom and Gudbrandsdal, in the stift of North Bergenhus	6,885; Wergeland; 1842.
Vangsnen, at Iustedal, Inner Sogn	5,864; Holmboe; 1829.

THE AMT OF ROMSDAL.

Hjelmen, northwest of Bærufjord, district of Nordmr. ..	3,201; Suhrlund; 1841.
Romsdalshorn, at Gryten, in Romsdal	4,117; Naumann.

THE AMT OF SOUTH DRONTHUM.

Dovre range of mountains:	
Knutshoe, east of Kongevold, upon the boundary between Gudbrandsdal and Opdal	5,456; Brock; 1826.
Kolla, west of Driva river, four miles in northwest from Hjærkin	5,548; Brock.
Nunsfjeld, Stenkolla, Skrunskolle	6,794; 1,030 feet higher than the mountain pass between Læs- sø and Opdal; Naumann.
Rottesjohoe, four miles northeast from Hjorkin ..	5,412; Brock.
Rödalshoiden, north of Foldal	4,800; Kraft.
Graasia, at Tydal, Sringen, and Sælbü	3,398; Hörby.
Grythatten, at Opdal, in the district of Guldal	4,526; Suhrlund; 1841.

Haftorslot, on the Swedish boundary, at the parish of Rörass	3,762 ; Hörby ; 1854.
Hammerklep, (the little,) at Trysil, near the Swedish boundary	3,257 ; Hörby ; 1854.
Langsövola, at Tysil, near the Swedish boundary	3,047 ; Hissinger.
Reisefjeld, at Meldal, in the district of Örkedal and Guldal	3,773 ; Heiberg ; 1859
Rulefjeld, upon the Swedish boundary, east of Lake Aursuen	3,639 ; Hissinger.
Skarsfjeldene, upon the boundary between Tydal, in Islbo, and Herjedal, in Sweden ; the highest horns, Grönstenstop	4,964 ; mean of two measures ; Hörby ; 1854.
Granittop	4,993 ; Hörby.
North Skarsfjeld, upon the Swedish boundary	4,705 ; mean of two measures ; Hörby ; 1854.
Skibroffjeld, upon the Swedish boundary, in the parish of Rörass ; boundary mark No. 146	3,603 ; by theodolite ; Hertzberg ; 1849.
Sylfjeld, upon the Swedish boundary, between Sælbu and Yemteland ; the highest horn, Syltoppen	5,869 ; Hissinger.
Vegelfjeld, upon the Swedish boundary, between Lake Ferugen and Herjedal, in Sweden	4,618 ; Other points of this range of mountains rises some hundred feet higher. Hissinger.
Vegelskaflet, a lower top of the Veögelfjelds, in the parish of Rörass, boundary mark No. 147	3,965 ; Hertzberg ; by theodolite ; 1849.
Oefjeld, at Tydal ; Sælbu, west of Esand	4,250 ; Hörby ; 1854.

THE AMT ON NORTH TRONDHJERN.

Bergsluen, upon the mountain called Gluken, near the Swedish boundary, at Meræger, in the district of Stördal	3,270 ; Hörby.
Fosdalsfjeld, the highest horn in the district of Inderöen	3,602 ; Keilhau ; 1831.
Gusledpiggen, in the district of Inderöen	3,304 ; Keilhau ; 1831.
Hermansnaasen, in the upper part of the district of Vardal	3,773 ; (geometrical method;) Schult.
Jomafjeld, near the Swedish boundary	3,767 ; Keilhau ; 1831.
Jærsfjeldene, in the district of Inderöen	Greatest height 4,323 ; Keilhau ; 1831.
Kjølhaugen, near the Swedish boundary, east of Stordal	4,190 ; Hissinger.
Sibmeken-Soupts, upon the Swedish boundary, in the north of Namedal, the lower edge of the glacier	3,443 ; Keilhau ; 1831.
Sibmekfjeld, at the Swedish boundary, district of Namdalen	About 4,735 ; Keilhau.
Skjækerhatten, the horn farthest to the north of Skjækerfjeldene, in the east of Sparbuçe, in the district of Inderöen	4,801 ; Schult.

THE AMT OF NORDLAND.

Buextinderne. (See Høitinderne.)	
Brurskanken, at Vefsen, Helgeland	4,338 ; Suhrland ; 1843.
Börsvatstinderne. (See Høitinderne.)	
Habris-Vaggie. (See Høitinderne.)	
Hatten or Hatfjeld, at Helgeland	3,781 ; Sohrland ; 1843.
Himmeltinderne. (See Bensjortinden, in the Finmark.)	
Høitinden, between Glomsfjord and Byerfjord, at Saeten	4,476.

There is another horn further to the westward, perhaps a little higher. Upon the west side of Buerfjord rises Stormyrtinden, Habris-Vaggie, and Romel Zhrok to a height of at least 3,600 feet. Further to the northward is a group of mountain horns called Buertinderne or Smaatinderne, Sandvats, and Börsvatstinderne, which all are over 3,000 feet high. Keilhau.

Jadnemsriset—point of the Swedish boundary; also between the amts of Dronthum and Nordland	3,933.	Other points upon this range of mountains are higher.—Keilhau; 1831.
Rigs-grandsen, (the boundary between Sweden and Norway;) middle height in Vessen, between boundary marks Nos. 207 and 208, near Harevand, (lake,) Helgeland	3,278;	Suhrland.
Ronsdalsfjeld, at the Opot. (See Bensjordtinden.)		
Sandhornet, at Gildeskaal, district of Salten	3,268;	Everest.
	3,184;	Essing.
Strandofjeld or Strandaafjeld, at Folden, Satten	3,202;	(by geometrical method;) Wahlenberg.
Sulitelma, near the Swedish boundary, at Salten:		
The base of the horn	5,902;	Wahlenberg.
The horn Almajalus	5,542;	Wahlenberg.
The North Saulo	5,658;	Wahlenberg.
Lomme-Javre	2,265;	Wahlenberg.
Troldtinderne. (See Strandefjeld.)		
Vefsen, at Helgeland, Brurskanken	4,338.	In the vicinity of this is situated Gedetind, about 200 feet higher. Suhrland.

THE AMT OF FINMARK.

Arbust-tinden or Aarbust-tinden. (See Bensjordtinden.)		
Akka-Oalgek, in the district of Talvig	3,395;	Von Buch.
Arnö, in the district of Senjerö and Tromsö	about 3,000;	Von Buch.
Bensjordtinden, between Balsfjord and Malangen	4,013;	Everest.
Tromsdalsfjeldet, opposite Tromsö, the group Geragas Zhjokko, or the glacier south of the junction of the rivers Bardu and Mols, Faxetinden, east of Andergö, Arbusttinden upon Andorgö, and Nonsdalsfjeldet, at Ofoten, all of these reach between 3,000 and 4,000 feet; also Vandtinden, upon Vandö, Tussen upon Grytö, Mosadlen upon Hendö, Vaagekallen upon east Vaage, and Himmelinderne upon west Vaage, reach a height between 3,000 and 4,000 feet; Keilhau.		
Golze-Varre, (Kavringtinden,) two miles south of Lyngsudet	4,195;	Keilhau. The horn Gaatza-gaesa, and several others, reach over 4,000 feet; Otterfjeld, Olmai Varre, at the upper end of Lyngenfjord, reach to about 4,000 feet; Keilhau.
Iedke, the highest mountain upon the island of Sieland, south of Hammerfest	3,556;	mean of five measures; Lundh; 1845. Iedke is covered by eternal snow.
	3,556;	mean of five measures made upon different days; Kloumann; 1847.
	3,495;	zenith distances, by Kloumann, from two points; 1846.
Kaaven, west of Langfjord	3,121;	Kloumann; 1847.
	3,105;	by zenith distances, from two points; Kloumann; 1847.
Kjærringfjordfjeld, (great,) upon the island of Stjunö, at Rogersund	3,136;	mean of three measures; Lundt; 1845.
Nonskarfjeld, upon the island of Stjernö, in the district of Talvig	3,551;	Von Buch.
Seiland, island in the Finmark	3,540;	Keilhau.
Storvandsfjeld, south of Storvand, (lake,) at Talvik...		
Vandtinden. (See Bensjordtinden.)		
Nordkap, upon Magerö, in the Finmark	1,009;	Von Buch

LAKES.

The length and breadth of the principal inland lakes of Norway, measuring over one Norwegian mile in length.

Name and location of lakes.	Length in English miles.	Breadth in English miles.	Height above the sea in English feet.
Mjosen, situated in about the centre of the stift of Christiania, in the amt of Agerhus; the largest lake in Norway.	54.08	1.52	425 feet, mean of five measures, four in July and the fifth on the 5th of August, by Hissinger; 426, mean of several measures in June, 1837, Keilhau; 415, mean of two measures, July and August, 1841, Keilhau and Suhrlund; 444, mean of two measures in the latter part of May, 1841; 422, mean of three measures made on the 6th, 21st, and 26th of July, 1843, Keilhau; 408, Hörby, June 30, 1848; 384, Hansten, by theodolite, August 15, 1847.
Rosvandet, at Vessen, Helgeland, in amt of Nordland.	12.00	12.00	1,378, mean of three measures, by Suhrlund, 1843.
Randsfjord, at Land, in the district of Hadeland, amt of Christians.	38.04	2.28	309, Von Buch; 491, Esmark; 341, Hansten; 432, mean of four measures upon three different days, Keilhau, 1838; 319, Carpelan; 508, measured at Rodnas, the upper end of the lake, Keilhau, 1845; 473, at Jonvold, Keilhau, 1845.
Famundsö, at Osterdal, in the amt of Hedemarken.	33.48	0.56	2,250, Hissinger; 2,188, mean of six measures, Hörby, 1848; 2,194, mean of twelve measures, Hörby, 1854.
Tyrifjord, at Ringerige, in the amt of Buskerud.	15.02	6.84	193, Keilhau, 1838; 242, Mashmann; 226, Keilhau and Suhrlund, 1842; 228, at Holsfjord, Næser, 1852.
The chain of lakes at Fredrikshald, in the amt of Smaalenene; height measured at Femiöen.	36.52	1.52	226, Boeck, 1834.
Store (great) Leesö, near the Swedish boundary, in the amt of Smaalehnene.	30.44	2.00	340, Keilhau and Boeck, 1834; 422, mean of two measures by theodolite, Hertzberg, 1849.
Tindsö, at Tind, district of Thelmark, amt of Bratsberg.	22.84	3.80	570, Esmark; 630, Hansten; 609, Mashmar; 550, Smith; 659, mean of several measures upon two days, Keilhau and Suhrlund; 667, mean of two measures, Næser, 1846, at high water; 581, Næser, 1853.
Otavand, or Vaågevand, at Gudbrandsdal, in the amt of Christians.	22.84	0.76	1,163, Naumann; 1,126, Broch; 1,214, theodolite, by Hansten, mean of thirty-six measures, in July and August, 1844; 1,208, mean of twenty-six measures in July and August, 1844, Andersen.
Niservand, at Nisedal, Telemark, in the amt of Bratsberg.	21.28	1.52	787, mean of four measures, Keilhau and Suhrlund, 1840; 873, mean of three measures upon different days, Næser, 1847; 758, by levelling, Sandborg.
Kröderen, in the amt of Buskerud, district of Buskerud.	21.28	0.76	471, Keilhau, 1838; 441, mean of two measures, Keilhau and Suhrlund, 1842; 417, Wergeland, 1840.
Mjös vandet, at Tind, Thelemark, in the amt of Buskerud.	18.24	3.04	2,844, Smith; 2,899, Bassoe, 1846; 3,012, mean of three measures, Næser, 1853.

Length and breadth of the principal lakes in Norway—Continued.

Name and location of lakes.	Length in English miles.	Breadth in English miles.	Height above the sea in English feet.
Snaasen-Vand, district of Inderöen, in the amt of North Drontheim.	18.24	2.28	66, Keilhau, 1831.
Nordsjö, in the lower Telemark, amt of Bratsberg.	18.24	1.52	77. This lake was formerly higher, but was lowered to the present stand by an earthquake. Carpelan; from 62 to 72, Keilhau; 128, Næser, 1844.
Byglandsfjord, at Raabygdela, amt of Nedenes.	18.24	1.12	661, mean of two measures, Næser, 1849.
Storsjön, at Rendalen, in the amt of Hedemarken.	18.24	.76	843, mean of four measures, upon two days, Horby, 1848,
Sælbusjö, in the district of Strind and Sælbu, amt of South Drontheim.	16.72	2.28	516, Naumann.
Fyrrisvand, at Moland, Telemark, amt of Bratsberg.	15.02	3.04	853, Sandborg, by levelling.
Öieren, at Lower Romerike, amt of Smaalenene; the junction of the river Nid and Glommen.	15.02	3.04	358, Boeck, 1834; 348, Keilhau, 1834. These measures were made at somewhat high-water stand; the high-water mark is from 24 to 28 feet (Norw.) above low water. In the year 1789, this lake rose 34 feet above high-water mark.
Toke-vand, district of Bamle, amt of Bratsberg.	15.02	1.52	120, Næser, 1847.
Vinstervandene, at Gudbrandsdal, Valdres, amt of Hedemark.	15.02	1.52	3,276, Broch. This measure was made on the east side of the middle lake, at a fishing hut there.
Lemingen, at the Swedish boundary, in the district of Namdal, amt of North Drontheim.	13.68	3.04	1,332, Keilhau, 1831.
Siredalsvan, at Lister, in the amt of Lister and Mandal.	15.02	.76	124, mean of two measures, Keilhau, 1839; at common stage of water.
Osen, at Trysil, in the amt of Hedemark.	14.44	1.52	1,473, Keilhau, 1838.
Nams-vandene, at Namdal, in the amt of North Drontheim.	13.68	3.04	1,343, Keilhau, 1843; measured at the west lake.
Bygdin, in the district of Valdres, amt of Christians.	13.68	1.52	3,623, Keilhau and Boeck; 3,623, Broch; 3,456, mean of several measures, Wergeland, 1843.
Herningsdal-vand, at Nordfjord, in the amt of North Bergenhus.	13.68	1.52	159, by levelling, Kragh.
Sulidals-vand, or Soledalsvand, at Ryfylke, in the amt of Stavanger.	13.68	1.52	143, Naumann; 267, Falkenberg, 1853; 269, mean of two measures, (under very unfavorable circumstances,) Naumann, 1853.
Totak-vand, at Vinje, Telemark, amt of Bratsberg.	12.	3.80	2,234 Maschmann.
Farres-vand, in the district of Laurvig, amt of Jarlsberg and Laurvig.	12.	1.52	Height not measured, or cannot be ascertained.
Lundevand, district of Lister, amt of Lister and Mandal.	12.	1.12	Height not measured.
Bandags-vand, at Laurdal, district of Thelemarken, amt of Bratsberg.	12.	1.12	219, mean of several measures, Maschmann; 232, Bassoe, 1847.
Spirilensö, at Aadalen, district of Ringerige, amt of Buskerud	12.	.76	535, Keilhau.

Length and breadth of the principal lakes in Norway—Continued.

Name and location of lakes.	Length in English miles.	Breadth in English miles.	Height above the sea in English feet.
Stor-sjön, at Odalen, in the amt of Hedemarken.	11.40	5.32	926, Esmark; 843, mean of four measures made upon two days; Hörby, 1848.
Slidrefjord, at Valdres, in the amt of Kristian.	11.40	0.76	1,255, Naumann; 1,194, Keilhau, 1845.
Norefjord and Tlovand, at Numedal, amt of Buskerud.	10.64	1.52	904, Naumann, measured at Norefjord.
Engersö, at Trysil, in the amt of Hedemarken.	10.64	0.76	1,575, mean of three measures; Keilhau, 1838.
Tunhovdfjord, at Numedal, amt of Buskerud.	9.88	1.52	2,316, Wergeland, 1842.
Læssö vand, at Gudbrandsdal, amt of Kristian.	9.88	0.76	1,714, Naumann.
Istersö, at Odalen, amt of Hedemarken.	9.12	2.28	Height not ascertained.
Ekernsö, at Fiskum, amt of Buskerud.	9.12	1.52	65, Næser, 1852.
Hurdalsö, at the upper Romerige, amt of Aekershoes.	9.12	1.52	564, Keilhau, 1837; 594, Keilhau and Suhrland, 1841.
Vegaardvandet, at Gjerrestad, amt of Nedenæs.	9.12	1.52	541, mean of three measures, Suhrland and Ellesen, 1840; 624, Næser, 1849.
Hitterdals-vand, at Thelemarken, amt of Bratsberg.	9.12	1.12	118, Næser, 1846.
Gjendin, at Vaage, district of Gudbrandsdal, amt of Kristian.	9.12	0.76	3,248, mean of six measures, Wergeland, 1841; 3,274, mean of five measures upon different days, Wergeland, 1843.
The Little Mjösen, or Vangs Mjösen, at Valdres, amt of Kristian.	9.12	0.76	1,535, Hansten; 1,542, Naumann; 1,565, result of several measures, Wergeland; 1,532, mean of two measures upon different days, Keilhau, 1845.
Gjerrestads-vand, at Nedenæs, amt of Nedenæs.	9.12	0.76	No height given.
Strandsfjord, at Hallingdal, amt of Buskerud.	9.12	0.76	1,529, Naumann.
Tunsöen, at Numedal, amt of North Drontheim.	8.36	4.56	Height not given.
Tyen, mountain lake, at Filefjeld, inner sogn, amt of North Bergenhus.	7.6	3.04	3,623, vol. 2 of Budstikken, page 388; about of same height as Lake Bygdin.
Færensö, at Stördal, amt of North Drontheim.	7.6	3.04	Height not given.
Opstryn, at Nordfjord, amt of North Bergenhus.	7.6	1.32	82, by levelling, Krag.
Solensö, or Sörlensö, North Österdal, amt of Hedemark.	7.6	1.52	No height given.
Siljords-vand, at the Parish of Siljord, amt of Bratsberg.	7.6	0.76	Height not given.
Kalhovd-vand, on the lower Maar-vand, at Tind, Thelemarken, amt of Bratsberg.	7.6	0.76	3,500, Keilhau and Suhrland, 1842.
Feragen, east of Röraas, amt of South Drontheim.	7.	1.52	2,271, Hissinger.
Vansjö, near and east of Moss, amt of Smaalehnene.	6.08	6.02	62, Boeck and Keilhau, 1834.
Eina-vand, upon the Toten, amt of Kristian.	6.08	1.12	1,252, Esmark; 1,338, Suhrland, 1841.
Aursund-sö, or Aursuen-sö, at Röraas, amt of South Drontheim.	6.08	0.76	2,252, Naumann; 2,408, Hesinger, mean of six measures; 2,262, Hörby, mean of six measures

Length and breadth of the principal lakes in Norway—Continued.

Name and location of lakes.	Length in English miles.	Breadth in English miles.	Height above the sea in English feet.
Sjakervand, or Skjakervand, west of the Skjakerfjeld, amt of North Drontheim.	6.08	0.76	1,541, Schult.
Nordmandslaagen-sjö, the head waters of Logenelv, upon the mountain plateau of Hardanger, Hardanger, amt of South Bergenhus.	7.16	0.76	4,153, Keilhau, 1845.

THE SNOW-LINE.

Altitude of the snow-line above the level of the sea.

Upon the mountains south of Ottevand, in Gudbrandsdal, in about 62° latitude.....	4,825 feet; Brock.
Upon the Dovre mountains in 61° of latitude.....	5,353; Naumann.
At Gjardesdal, Mauranger, in the district of Hardanger, amt of South Bergenhus, in latitude 60°.....	3,575; Sexe, 1859.
At Lodalskaupe, at Nordfjord, in the amt of North Bergenhus, in latitude 62°.....	5,542; Von Buch; 5,414; Bohr.
In the mountains about Storhougen, between Lyster and Iustedal, Inner Sogn, amt of North Bergenhus, in latitude 61°.....	5,353; Keilhau.
In the mountain range between Iölster, at Söndfjord and Invigsfjord, at Nordfjord, amt of North Bergenhus, latitude 61°.....	4,117; Naumann.
Upon the west side of the island of Seiland, amt of Finmark, latitude 70° 5'.....	2,965; Keilhau.
The mean height of the snow-line upon the island of Seiland, latitude 70° 5'.....	3,088; Keilhau.

The height of the snow-line as established by Professor Leopold von Buch.

Commencing under latitude 60° 00', at 5,661 feet over the sea.
Commencing under latitude 61° 00', at 5,353 feet over the sea.
Commencing under latitude 62° 30', at 5,012 feet over the sea.
Commencing under latitude 63° 30', at 4,632 feet over the sea.
Commencing under latitude 67° 00', at 3,705 feet over the sea.
Commencing under latitude 70° 00', at 3,397 feet over the sea.
Commencing under latitude 71° 00', at North Cape, 2,265 feet over the sea.

Explanation of terms and names of mountains.

- Aas*, common name of a lower mountain-back or ridge, often covered with timber. This term is rarely used in the north of Norway.
- Berg, bjerg*, mountain; the former more common.
- Brat*, a very steep mountain. This term is only used in the south of Norway. Sometimes it means a high mountain, seen some distance at sea; mostly used by seamen and pilots. In the north the word *roe* denotes the same.
- Bræ, bre, fond*, mountains covered by eternal snow or ice. *Bræ* mostly means ice-covered, such as Josteretatsbræen. *Fond* always means snow-covered. *Folgefond*.
- Fjeld*, mountain. Common term all through the country.
- Fond*, see *Bræ*.

- Gust*, light wind. Mountains are called so probably because the wind generally blows from the mountain. Vonsjogusten.
- Haagn*, a high but not cone-shaped mountain. Elgaahaagna.
- Hammer*, a steep, precipitous, and sometimes projecting mountain. This term is common throughout the country. Kampenhammerne.
- Hat, heite*, hat, or cap-formed shaped mountain, generally snow-covered. Common throughout the country, but mostly from Dover northward. Skjækerhatten, Nehatten, Snehætten, Pighætten.
- Haug, Houg*, mostly in the south of Norway, signifying rounded, dome, or haystack-shaped mountain. Jemdalsbougen.
- Hei, heid* mountain plateau. This term is common all through the country. Hogeheia.
- Horn*, common name of horn or alp-formed peaks. Skogshorn, Remsdalshorn.
- Hovd, hovde, hoved*. These terms are mostly used south of Dover, signifying large, projecting mountains. Synhovd, Reksjöhovd.
- Hö, hoe, hog, hogd, hoi, hvide*, signifying large dome-formed mountains, sometimes cone-formed. Storhoi, Humdalshoe.
- Jökel, jukel*, common in the whole country, signifying glacier, or mountain covered with ice. Hallingjökelen, Jukeleggen.
- Kaupe*, common name of mountain covered with eternal snow. Lodalskaupe.
- Kamp*, common name south of Dover of dome-formed, often isolated mountain without peak. Askamoen, Svartekampen.
- Kirke*. This term is most common in the south of Norway, signifying high, precipitous, and projecting mountains. This name is also supposed to have been derived from legends of churches which before the reformation are said to have existed in the high mountains in the amt of Kristian. Synslaukjerken, Svarlhulkjerken.
- Kjærring*, mountain sometimes like the shape of an old woman in a sitting posture. Vehuskjærringa.
- Kjöl*, very common name of a mountain ridge dividing valleys. Røtingsjölers.
- Klemp*, a round dome-formed mountain. Bredklenklempen. This term is very seldom used.
- Kep, kleppe*, large and wide, but not alp-formed mountain. Blaahaaklep, Lennekleppen.
- Klet*, common name, particularly at Osterdal, signifying high, precipitous mountain. Solenkletten, Blaakaakletten.
- Klub, klump*. Klub is mostly used in the names of mountains situated upon the coast, signifying cone-formed, but in the interior more rounding or dome-formed mountains. Kjøihouklubben, Standaisklumpen, Kvitkjæmklubben.
- Knip, knippe*, common in the stift of Drontheim, signifying mountain appearing to be in many parts, or a bunch or cluster of mountain horns very close together. Grønsendknippen, Nysælerknippen.
- Kolle*, rounded or dome-formed mountain. Common term in all parts of the country.
- Kule*, only used in the south of Norway. A round or dome-formed mountain.
- Kuv*, in the interior signifying a mountain of considerable height, rising above others in the vicinity and not alp-formed; upon the coast, a round rock. Storkuven.
- Kviting*, light-colored high mountains, or sometimes when covered with snow. Gjönekvitingen, Kvitingen, Kviting skjölen.
- Naas nase nos*, steep, precipitous, but not pike-formed mountain. Nybunaaset, Maarsnaas, Hermansnaasen.
- Nut, nad, knat, knap*, common name of a flat, rounding mountain. Sölenatten, Huledjurnatten.
- Nut*, high, but not alp-formed mountain. This name does not appear in the south of Norway. Baasnuten, Borgundnuten.
- Pig*, high and alp-formed mountain. Elgupiggen, Storhöpiggen, Guslepiggen.
- Skaft*, high mountain with extended base, which, when seen from the side, appears as a very gradual descent. Vegelskaftet.
- Skag*, a term not always of the same signification. In the south it means a steep and high-rising mountain; in the north a mountain wall. Skaget. On the north coast it often denotes a nearly perpendicular mountain wall. Lappeskagen. Also, a low, naked, extended cape. Hærneskagen.
- Skar, Skard*, common in the whole country, signifying a mountain in which appears to be a rift, or to be cloven, notched, or a narrow crevice. Dyrskardet, Gaakelskardet, Brudskardet, Skarifjeldene, Sælerskardet.
- Skarv*, a high, naked mountain, often covered with loose masses of rock, common in the southern amts of Norway. Hallingskarven, Söskarven, Storskarven.
- Skavl*, mountain with deep covering of snow. Vosseskavlen, Blaaskavlen.
- Skolt, pande*, name of broad, steep-rising mountains with rounded top.
- Stöl*, mountain meadow. Haastolen.
- Stöt*, a steep mountain with flat top. Havsterstöten. This term only appears near the Swedish boundary, and is believed to have been derived from the word Stötte, (mark,) from the presumption that at some former times there have been boundary marks upon these mountains.

Tind. This term is common over the whole country, signifying they upon larger mountain masses rising, cone-formed tops, alps, peaks. Naulgaardstinden, Suletind, Tessungtinden, Præstetind.

Top, Tip, tup, same signification as tind.

Varde. This term is often used in the south part of Norway, and denotes high mountain which might be seen a great distance at sea. Degervarde.

Vol is supposed to have the same meaning as Varde, but according to Hörby (*New Magazine of Natural Science*) it appears that this term, at least in some parts of the country, denotes a gradual ascending mountain, without having any mark or varde upon its summit. The term is common, particularly in the eastern portion of the country. Kvitvola, Bustvola, Finvola.

Reference to reliable publications and persons.

Bassøe, C., lieutenant colonel of artillery: Measures of Heights by Barometer in the Amts of Buskerud and Bratsberg in 1846.

Measures of Heights by Barometer in the Amt of Bratsberg, 1847.

Measures of Heights by Barometer in the Amts of Bratsberg and Nedenæs, 1848.

Boëck, C., professor, (Boëck & Keilhau:) Travels in the Amt of Smaalenene, 1834.

Bohr, G.: Of the Glaciers of the Josterdal. Journal called Blandinger, volume 2.

Broch, Th., general of engineers: Observations and Height-measures, &c. Magazine for Natural Science, volume 2.

Observations and Height-measures. New Magazine of Natural Science, volume 1.

Buck, Leopold Von: Travel from Christiania to Bergen. Topographical and Statistical Collections, volume 1.

Carpelan, W. M., colonel: A Visit to the Mountain Hut, 1823. Published in Magazine of Natural Science, 2d an., volume 1.

Esmark, professor: Travels to Drontheim. Published Christiania, 1829.

Observations upon a Journey to Gausta Mountains. Topographical and Statistical Collections, volume 1.

Everest, Rob.: A Journey through Norway and Sweden. Published London, 1820.

Falkenberg, lieutenant colonel: Height-measures by Barometer in the years 1852, 1853, and 1855, in the Amts of Stavanger and South Bergenhus. Manuscript. Published by government, 1860.

Fearnley, C., professor: Report of a Geographical Journey in Gudbrandsdal, 1841. Published 1845.

Hansteen, Chr., professor: Geographical Results of some points in the vicinity of Christiania. Magazine of Natural Science, 1824, volume 1.

Observations upon a Journey to Bergen, 1821. Budstikken, volume 3.

Heiberg, lieutenant of artillery: Height-measures in the Amt of South Drontheim, 1850. Published by government, 1861.

Hertzberg, H. R., capitaine: Height-measures by Barometer upon the Boundary Line between Sweden and Norway. 1849, volume 2.

Hisinger, Wm.: Notes of Physical and Geographical Observations. Published at Uppsala, 1849.

Height-measures (tables) in Sweden and Norway. Stockholm, 1829.

Holmboe, B., professor: Height-measures by Barometer on a Journey to Bergen, 1829. Manuscript not published.

Hörby, J. S.: Notes of a Geographical Journey in the District of Osterdalen, 1848.

Height-measures of portion of the Swedish Boundary Line. Published in New Magazine of Natural Science, volume 8, 1845; volume 2, 1840.

Keilhau, B. M., professor: Journey in the East and West Finmark. Published in Christiania, 1831.

Journey in the Amt of North Drontheim. Magazine of Natural Science, volume 1, 2d series.

Geographical Observations in Osterdalen. New Magazine of Natural Science, volume 2.

Journey in the Amts of Lister and Mandal. New Magazine of Natural Science, volume 2.

Journey to the East part of the Stift of Christiansand, 1840. New Magazine of Natural Science, volume 3.

Geological Observations and Height-measurements on a Journey in the Districts of Valdres, Hadingdal, and Sogn, 1845. Measurements of Heights in the years 1841, 1842, and 1843. Manuscript partially published 1845.

Klouman, F., colonel of the staff: Height-measures by Barometer and Zenith Distances at the Survey of the Finmark in the years 1846 and 1847.

Kraft, J., judge: Topographical and Statistical Description of Norway, 6 volumes, published at Christiania, 1820-1835.

- Krugh, H., lieutenant of artillery: Height-measures in the Amts of South and North Bergenhus and the Romsdal. Manuscript.
- Lessing, C. F.: Reise durch Norwegen and die Lofoden, durch Lappland und Sweden, Published at Berlin, 1841.
- Maschmann, P. J., professor: Height-measurements by Barometer; Observations in the Finmark, 1832.
- Naumann, C. F., professor: Beiträge zur Kenntniss Norwegens, 2 Bind, Leipzig, 1824.
- Næser, F. P., colonel: Height-measures in the Amts of Buskerud and Bratsberg in the years 1846 and 1847.
- Height-measures in the Amt of Christiansand, 1849.
- Sandborg, C., civil engineer: Collection of Heights, by Levelling of the Old Highway from the Ferry-station of Spjotsod to Nesservand. In manuscript, only partially published.
- Schioth, Anton: Geographical Description of the Kingdom of Norway. Published at Christiania, 1849.
- Sexe, professor: Height-measures in the Amt of South Bergenhus, 1859.
- Smith, Chr., professor: Observations on a Journey in the Mountains of Norway, 1812. Topographical Collections, 2 volumes.
- Suhrland, professor: Height-measures upon a Journey to Drontheim and Nordland in the years 1841 and 1843.
- Suhrland and Ellisen: Height-measures in 1840. Published in New Magazine of Natural Science, volume 3.
- Vibe, A., major of engineers: Measurements of Heights in Norway. Christiania, 1860.
- Wahlenberg, doctor of theology: Height-measures in Scandinavia.
- Wergeland, R. St., major general, secretary of war: Height-measures by Barometer in the Amts of Bergenhus, Aguerus, Buskerud, and Christians, 1840, 1841, and 1842.
- Measurements of Heights by Barometer in the Mountains of the Districts of Hallingdal and Gudbrandsdal, 1843 and 1845. Published by government.

1875
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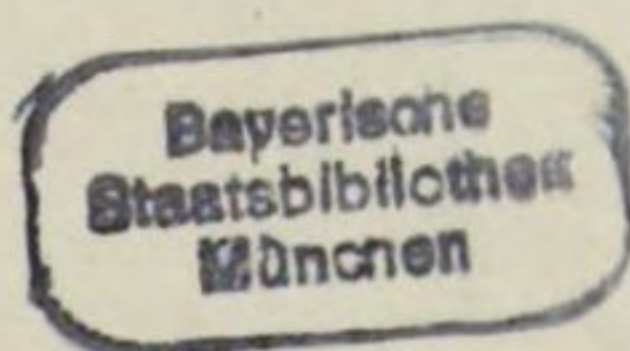
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